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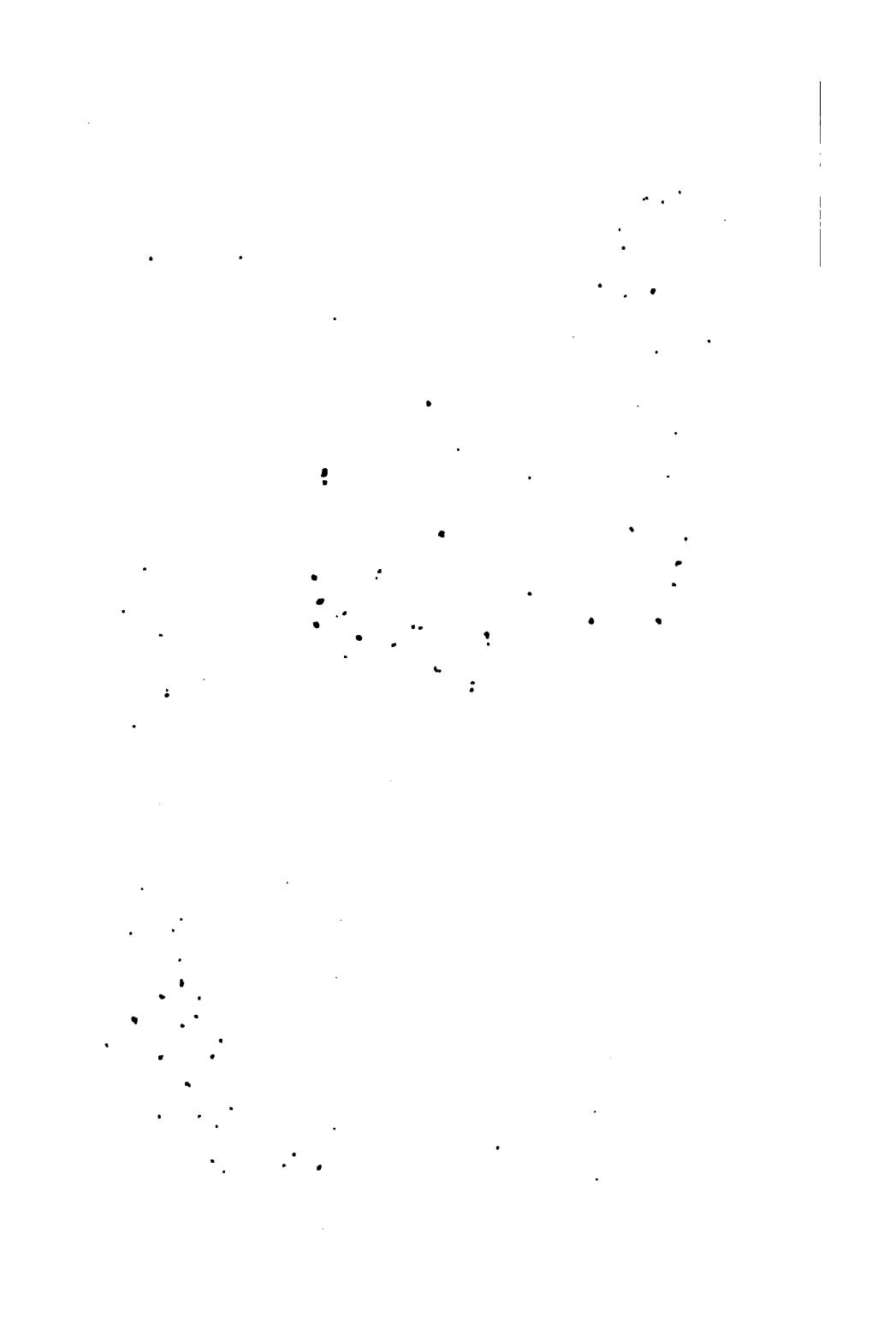
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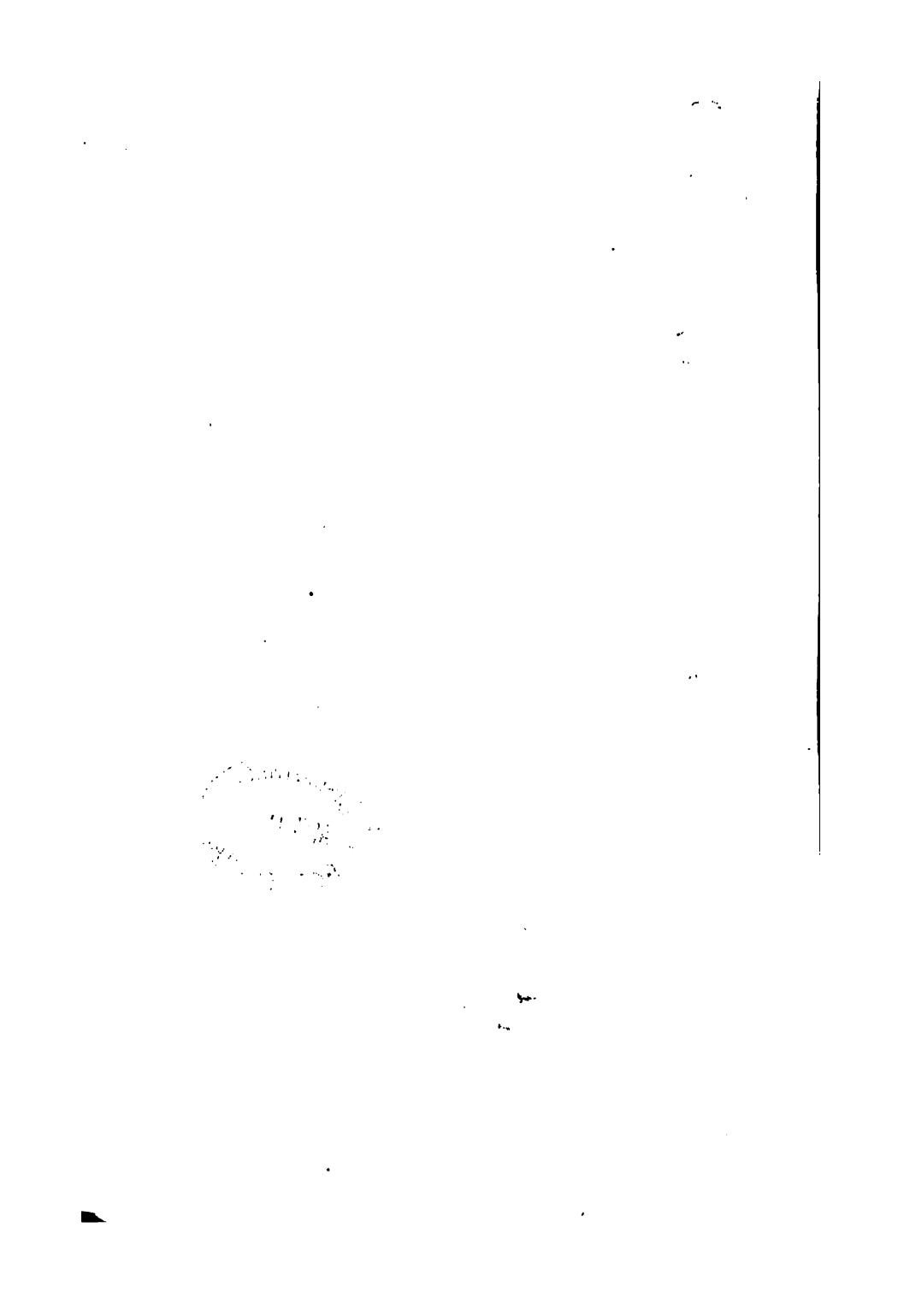








INDIAN NOTES



INDIAN NOTES

BY

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LONDON

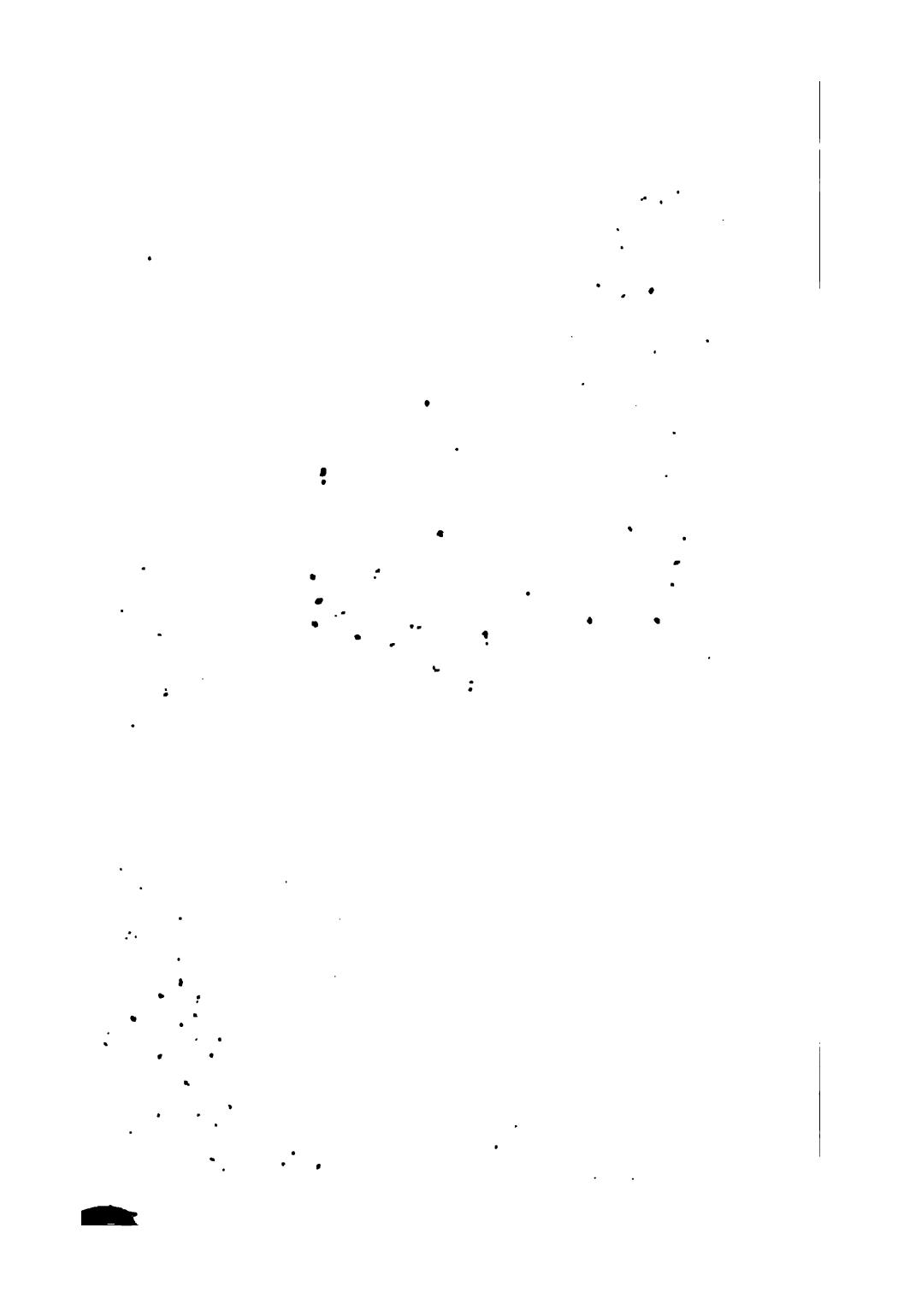
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INDIAN NOTES

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INDIAN NOTES

CHAPTER I

THE VOYAGE OUT

IN 1872 at the co-operative stores were purchased strong leather portmanteaus, which, legibly numbered and marked with large zigzags in white paint, are still serviceable in 1879 after endless trials of endurance on board ship, in camp, in bullock-carts, else when conveyed by elephants, mules, rolling camels, or reckless coolies. Exposed to heat, rain, cold, the ravages of insects, the vicissitudes of travel, these portmanteaus answered better than boxes of wood or tin. One key, worn always on a steel watch-chain (together with scissors, pencil, corkscrew, knife, and button-hook incorporated), will suffice to open every package. Drawer-cases dragged about Canada in 1861 proved an incumbrance in Bengal, and on a Himalayan road were smashed by falling rocks. At large stations, what with auctions or bazaars, all needful furniture can gradually be reasonably bought. Leaving their measure, especially for boots, ladies can get things out so easily by parcel-post that, beyond voyage requirements, an outfit could be considerably reduced. From really good chemists

mothers should procure a tin box containing quinine, ipecac., chlorodyne, bromide of potassium, pyretic saline, aperient pills, and mustard-leaves. From the best shops get patent foods, condensed milk, cocoa, biscuits ; also be provided with soap, towels, stomach-warmer, child's enema, flannel belts, water-proof sheeting, extra feeding-bottles, tubing, — in fact, all nursery essentials. Disinfectants can be obtained on board, as well as toilet vinegar ; and lavender water is procurable from the steward. Asthmatic persons should take a stock of stramoniun cigars. Surgical appliances, trusses, elastic stockings, spectacles, take in duplicate ; and remember that during sea-sickness artificial teeth might be lost. Dinner-napkins are not supplied in saloon. Racks and cabin-pegs being limited, it is expedient to keep small articles in numbered bags. Take paper cuffs, collars, or other appendages, besides plenty of linen and under-clothing. A certain amount of washing is conducted on the voyage, but beware of the risk in sending things ashore at Malta when the stay is short. There the bath-sponges, lace, coral, cameos, silver filagree, are not particularly cheap. White kid gloves are reasonable, and at Port Said the capital bath slippers are worth buying. Retaining twenty sovereigns for contingencies, conceal as many more as possible in the heavy baggage for profitable exchange in India. This baggage is to be labelled in large letters on a *white* ground. That intended for present use should be marked on a *green* ground, "Present-use Baggage-Room for Ladies only," and will be daily accessible. In the cabin each officer or lady will be allowed two portmanteaus, each thirty-six inches

long, fifteen wide, fourteen deep, and bearing yellow labels. It is safer to have these coloured designs liberally painted over packages, as rough handling is unavoidable. Any amount of rope cordage will be valuable for the protection of boxes containing saddlery. Unframed pictures, especially chromo-lithographs (packed in portmanteaus), will be always portable, and sell well at auctions. Officers and ladies outward bound are recommended to have their *light* clothing for use in the Red Sea, and on homeward voyage *thick* clothing packed in separate boxes, distinguished by a *blue* label marked "Change of clothing required at Suez—Baggage-Room." These boxes, stored near the door of the baggage-room, can be found soon after leaving Suez or Port Said. Bed-linen provided for military officers and families will be changed thrice on the voyage. The colonel commanding will take charge of money or valuables if packed in small compass. All bills must be paid in cash before disembarkation. According to "regulations for Her Majesty's Indian troop-ships," the messing charges for families of military officers or others entitled to passage at the public expense will be:—For ladies over sixteen years, 5s. a day; children seven to sixteen, 3s. 4d.; from one to seven, 2s. 6d.; for infants, no charge; for female servant, 9d. to 2s. a day, according to rates.

Certain Rules.—Children and nurses to keep on starboard side of deck. Children to be out of the saloon except at meals. (It would be a great boon if all vessels had a small place of shelter on deck similar to that of the *Serapis*.) Except on medical certificate, no food allowed in cabins—a very wholesome rule, as putrefaction becomes rapid. Ports and

scuttles to be opened by carpenters only, as the drenching sea is very treacherous. Damp or wet clothes not to be hung up in cabins, but on deck lines—a very inconvenient plan, ladies think, whilst forgetting the pestilential dangers. No regulations can be too stringent to check people careless about matches or unprotected lighted candles. On dark nights it may be difficult to meet infantile wants, and where absolutely necessary the fixed lamps will be kept burning.

Ladies' Cabin.—Accommodating seven occupants, greatly depending on each other for peace, quiet, comfort, and health-preservation. Twice a week the captain goes round, when, excepting invalids, all are out. At other times no persuasion will induce certain ladies to sit in the saloon or up on deck. Sickness is provoked, and the others are made miserable. Jewellery, rings, bracelets, trinkets, should be packed up in the heavy baggage in boxes secured with letter-puzzle padlocks.

Nursery.—Accommodating twelve to twenty-four children, will require constant attention to enforce cleanliness to avert pestilence. Disinfectants, especially carbolic acid, frequently required. Turpentine might be sprinkled over linen generally, and certain woodwork periodically tarred to disgust insects, likewise to combat any latent poison, for instance, measles, whooping-cough, diphtheria, or erysipelas. Nurses *must* not congregate here at all hours. To prevent thrush or diarrhoea mothers *must* see that feeding-bottles and tubes are washed out with Condy's fluid; also that condensed milk and patent foods be properly cooked. Baths should be fitted with steam-pipes, for besides lavatory purposes, what with in-

fantile cramp, croup, colic at night, it is extremely difficult quickly to get cans of hot water to meet contingencies not admitting of delay. Saloon meals appear very good, but the time is scarcely sufficient for dinner to avoid bolting of food by hungry boys and nurses. At once place the children's seats near the carver, and make friends with the chief steward. At Malta or Port Said do not stuff the family with oranges and sweets.

Possible Ailments.—Infantile convulsions, especially during storms, hot weather, general turmoil or excessive noise at night. Unaccustomed food, salt meat, biscuits, coarse puddings, the want of vegetables or lime-juice, the troubles of teething, want of cleanliness, bad smells, constant cooping up in cabins, will provoke tendencies to diarrhœa, boils, debility, or scurvy. Turpentine enemata, cold applications to head, mustard poultices, and the gum lancet, may be required. In warm weather, late in the day, after a heavy meal, when the sun has declined so as to slant beneath the awnings, when the air is still and stifling, or when unavoidably all ports have been closed even for a very short time, the apoplectic require care. Light sun-hats should be secured with stout elastic; intense glare mitigated by blue or green goggles; thirst relieved by tea or claret-and-water, to the exclusion of beer, spirits, sherry, or port. Besides ophthalmia, bronchitis, infantile remittent, toothache, headache, neuralgia, disposition to various haemorrhages, and for trifling scratches to become festered, the other ailments most common will be phases of dyspepsia due to want of exercise or over-eating. Insufficiency of warm clothing is a common mistake, and great will

be the comfort afforded by thick-soled boots, warm slippers, a stout ulster, thick veils, and flannel night-caps. Pain may be averted by visits to dentists, oculists or chiropodists before embarkation, and comfort increased by close hair-cutting. Prickly heat, the first step towards comparative acclimatisation, can be relieved by careful diet and the application of sulphate of copper. Mild mumps may appear after prolonged wet weather in winter months, or be imported in the same manner as measles, variola, varicella, whooping-cough, enteric or scarlet fever ; hence previous precautions to avoid infection risks, and even the youngest infant should bear vaccination marks. Sore throats on the Suez Canal have been attributed to floating fungi flourishing in polluted air. Colds are due to draughts, or to chills on deck after close confinement below. Mild fever about Malta differs from the thermal variety of the Red Sea. When mothers want cabin lights after hours, bear in mind that the consumption of oxygen and the production of carbonic acid by each lamp will materially increase headache, lassitude, and general malaise. Unless space be ample, ventilation, in spite of cowls, wind-sails, steam-jets, or pneumatic contrivances, appears impracticable without causing currents of air injurious to some persons ; therefore all the more occasion to spend most of the day, if possible, on deck. When coaling, or if awnings be removed, the wearing of goggles will protect the eyes from painfully irritating grit ; and to avoid the facial neuralgia of cutting winds, ladies should wear warm cloth caps with ear-flaps. Deck-swabbing, however injurious, cannot be stopped, as ships foul so quickly, especially under the influence of moist,

muggy heat; but on return voyage, after passing Gibraltar, dry scrubbing and hot sand can be substituted in cold or sickly weather. At Malta, hot and dusty in summer, muddy and cold in winter, exposed to blazing sun, to damp south-east wind and heavy dew, it is not unlikely that headaches, influenza, or sea-sickness may here temporarily relapse, and fretty children who had forgotten any tossing in the Bay of Biscay may now recommence to aggravate the miseries of the night by the weary constant cry so annoying to invalids or old bachelors, who in vain plug their ears with cotton wool, and more than annoying to poor worn-out mothers deserving of all sympathy when doing their best to lull fractious little ones. At Malta and Port Said keep away from sick beggars with sore eyes. In the Suez Canal, the hot day, the sand, glare, and dust will be succeeded, when anchored for the night, by chilly cold, heavy dew on deck, perhaps a stuffy air in the cabins, and the bath water may not be satisfactory. If the road be clear the eighty-eight miles are soon accomplished, as the navigation is now so well known, and the channel appears to clear itself without dredging. Although the Red Sea is hot all the year round (80° to 88° in cabins during trooping season from October to March), still the heat is comparatively dry and often less oppressive than a lower temperature in mid-ocean for the five days. If the ports have to be closed it is unpleasant below, whilst on deck a damp, moist, salt, sandy wind may account for rheumatism or infantile colic. The Indian Ocean is rather enjoyable except during cyclones, the temperature 77° to 85°. Bombay would be about 83°. As regards sleeping on deck under an awning, there would appear no diffi-

culty about ladies and children there seeking repose on sultry nights, but opinions are greatly divided, as cramp, colic, or neuralgic liabilities have to be taken into consideration. Many strong ladies, it is reasonable to believe, would appreciate the privilege of having a place screened off, where, suitably attired in flannel, they could lie down on deck.

Sea-sickness.—Amongst endless uncertain remedies or suggestions, occasionally serviceable, may be mentioned oxalate of cerium in four-grain pills, chloral, creasote, pyretic saline, chloroform or nitrite of amyl inhalation, tight belts, ice-bags to spine, galvanic belts. After blue pill, colocynth, and podophyllin, slop diet, ice-sucking, sinapisms over neck and stomach, recumbent position, free ventilation, a very hopeful treatment is for the surgeon to try morphia hypodermically. Champagne is too often a mere waste of money, and chlorodyne may upset digestion entirely. Relapses may be provoked by night-chills or dietary indiscretions at Malta.

The Voyage.—Portsmouth to Gibraltar 1127 miles ; Malta, 988 ; Port Said, 937 ; Suez, 88 ; Perim, 1201 ; Aden, 97 ; Bombay, 1644 ; stopping at Malta one day and night, at Port Said a few hours, at Suez just time for postal arrangements. In the ship's library will be found books telling about interesting places passed ; but too often even the most attractive novel only lulls to sleep the languid, short-tempered traveller. The medical manuals by Bull, Chavasse, or Moore (the latter specially arranged for India) can always be obtained from Calcutta. With music on board all stereotyped amusements will be eclipsed by dancing exercise. Awnings are spread during nights in Red Sea and Indian Ocean, or whenever practicable. The

change of climate is rapid in the short time, long enough for *ennui*. The voyage may soothe, brace, excite, or irritate the nervous or digestive system. Cases of dyspepsia, rheumatism, gout, asthma, bronchitis, hysteria, sick headache, dimness of vision, and many skin diseases, may marvellously improve. Containing ozone, aqueous vapour, bromine, iodine, &c., sea air is pure, free from organic particles, and having comparatively an equable temperature, must prove extremely beneficial to the majority of deck promenaders.

CHAPTER II

TRAVELLING IN INDIA

FROM Bombay to Allahabad the distance will be 845 miles, and 713 on to Lahore, making a total of 1558, thus divided : Egatpuri, 85 ; Deolalee, 28 ; Khundwa, 240 ; Sohagur, 141 ; Jubbulpore, 122 ; Allahabad, 229 ; Cawnpore, 120 ; Etawah, 87 ; Toondla, 57 ; Allyghur, 35 ; Ghazeeabad, 66 ; Meerut, 30 ; Mozuffurnuggur, 35 ; Saharanpore, 36 ; Umballa, 50 ; Loodiana, 71 ; Jullundur, 32 ; Umritzur, 52 ; Mean Meer, 29 ; Lahore, 3 miles. About five days are required for the journey when travelling by passenger trains, which are generally delayed at Allahabad. At large stations there are refreshment-rooms where breakfast, dinner, or supper can be obtained, besides lavatory conveniences, including baths. Considering the few trains on single lines, the stoppages might be longer in the cool season, to afford ample time for toilet arrangements, including the cleaning of dusty carriages, and to avoid the bolting of tough, indigestible, greasy meats, or monotonous viands. Irregular meals or snatches of food, the ancient "*quis separabit*" chicken, or the indiarubber steak, may upset bewildered new arrivals, perhaps burdened with querulous children and a helpless nurse. If proceeding with troops, the journey commenced at night will terminate at a rest-

camp next morning, to remain all day in tents or barracks, and start again in the evening. In all camps, and occasionally at railway-stations, thieves may lurk about. Oil-lamps should be trimmed to burn brightly in the carriages, which need not be crowded; and the day glare is diminished by blue-glass windows. Ladies in their saloons can partially undress and change clothes in the morning. Amongst comforts, or often essentials, may be mentioned soap, towels, hot-water bottle, spirit-lamp for cooking, tea, biscuits, essence of beef, good brandy, chlorodyne, soda-water, quinine, sal volatile, tincture of opium, turpentine, and mustard. Thick rugs and tightly-stuffed pillows will somewhat lessen fatigue, and an abdominal flannel belt will be very useful at night. Drinking water, tea, or brandy-and-soda constantly is merely an idle, injurious habit in the cold season, when dysentery, diarrhoea, or gastric irritation may be provoked. If not blessed with sufficient self-denial to limit stimulants to a minimum quantity—say two ounces of brandy or whisky, taken only in the evening—it is better to turn total abstainer, and besides health advantages the economy will be enormous. An amazing amount of liver disease can be traced to the indulgence of a craving for beer as a habit started on first arrival and most difficult to abandon. As for tobacco, it is the ruin of thousands, and the man who does not smoke will often preserve his digestion, his spirits, his temper, and his nerve, besides escaping palpitation and terrible depression, possibly eventually culminating in insanity. The non-smoker is more susceptible to treatment when suffering with malarial fevers or dysentery. The moderate smoker, however, often

finds infinite solace in his pipe when troubled with insomnia, neuralgia, or constipation, or when drenched or fatigued on the march. Neuralgic pains affecting face, eyes, ears, or neck, sometimes at night become very distressing ; and the gouty should never travel without small supplies of bromide of potassium, colchicum, or laville. It is customary with some mothers to telegraph along the line for milk, but no dependence can be placed on the quality unless there are friends at command. Loose coupling of carriages, a day's rail exceeding a hundred miles at the commencement or the end of the cool season, the difficulty of securing suitable food, the brain and spinal cord fatigue, may endanger fragile children prone to fever, diarrhoea, or convulsions during dentition. Better to break the journey, for the luggage will arrive at proper destination gradually. In rest-camps medical attendance is provided, and at large stations every reasonable succour in distress can be obtained.

When travelling down-country homewards, experienced mothers are occasionally inclined to run the dangerous risk of not allowing sufficient time for rest, and the sickly suffer all the more on board ship afterwards ; or at Bombay, too ill to embark, may there be uncomfortably detained with all their packages in a bustling, expensive hotel. With some children the vibration of sound, and the rushing through the warm air may lull them to sleep, and with water convenient it is easy to apply wet handkerchiefs to heated heads. Insect powder or the sprinkling of nim leaves may in carriages be required. Delayed at Jubbulpore, strong excursionists might drive to the lovely rocks of white marble banking the Ner-

budda River. At Toondla take the rail to see the marvellous tomb at Agra. At Ghazeeabad divert to Delhi, the Rome of Asia. Other places are horribly alike ; and, excepting the celebrated ghâts near Bombay, and the blue hills about Jubbulpore and Umballa (often indistinct), there is nothing to see ; and the Ganges, Jumna, Sutlej, or other rivers, are more remarkable for magnificent bridges than for any landscape beauty whilst flowing through the flat sandy plains. From Bombay to Lahore the best plan is to lie down in the first-class carriage all day as well as night, for more demands on energy may be required for steamer, palkee, dak-gharry, shigram, bullock-hackery, camel-cart, elephant, or any other conceivable conveyance to isolated, out-of-the-way localities. Gharrys (resembling four-wheel cabs, adapted for lying down) should not go more than forty miles in twenty-four hours if the cargo includes young children. Along broad, level roads, shaded by sweetly-scented flowering green trees, the journey is pleasant enough. But out of the beaten track or in native territory, the jolting over pebbles, boulders, or rickety bridges of boats, and the discomfort of temporary detention midway in the mud or sand of a rapid flowing river until the natives apply their shoulders to the sinking chariot-wheels, must all be endured as unavoidable. It is advisable not to place valuables within reach of the light-fingered riding behind on a dark night. An empty paillasse, periodically re-stuffed with tightly-packed straw, dry grass, or sugar-cane, will make an excellent couch, and rugs with hooks or buttons to envelop the traveller, sack fashion, ought not to roll off during the crisp, cold chill before sunrise. The water-proof sheet, the

hurricane lantern with matches, should not be forgotten, nor mosquito curtains, and old gloves to prevent the hands becoming filthy. Oil and candle lamps can be purchased in some bazaars. A bad lantern is easily smashed, perhaps on a dark stormy night, when the bewildered wanderer seeking a tent may stray into the jaws of a camel. Halting at rest-camps is arranged to diminish inconvenience, and if carriages be overcrowded the medical officer is at hand to protect weakly men, women, or children requiring extra space or special care. Pregnant women should not be conveyed on elephants if possible, and the liability of premature births in railway-trains or camel-carts must be remembered. The hackery, somewhat resembling a pedlar's van, crawls slowly along the hot dusty roads at the will of long-suffering bullocks, which naturally expect passengers to walk occasionally to stretch their limbs in the cool of the morning or the shade of the evening. Troops formerly were frequently taken up the Ganges in country boats under instructions to avoid anchoring at night near marshes or swamps, or under a high bank or dense bushes. Over-crowding, tedious delays, bad food, bad weather, endless objections, invited scurvy, malarial fevers, cholera, and dysentery, in sickly months or situations. Intense heat, chilly nights, disastrous storms, drenching rains, and the probability of drifting aground had also to be chanced. Dooly conveyance by easy stages can be adapted to meet invalid requirements, especially on a good level road, if properly selected bearers are judiciously treated. Difficult is it to contrive a strong yet light uncomplicated pattern, portable in small compass by rail, for, although the bearers are not now

powerful men, there remains a prejudice in favour of the cumbrous, antiquated dooly, in reality a capital bed upon which desperate cases can be conveyed to the hills eventually to recover. Neither elephants, camels, nor certain bearers can manage inclines, which must be traversed by mules, sure-footed ponies, or hill-carriers accustomed to rain, snow-storms, and slippery roads. Up to Simla the spiral, tortuous drive in a two-wheeled gig or tongha, to ascend beyond 6000 feet, is comfortably and expeditiously performed by swift ponies frequently relieved. Up to other sanitaria passengers by mail-cart must be prepared to undergo much shaking, bumping, or jolting, especially when showers, streams, and torrents damage the narrow roads along the limestone ledges sometimes overhanging perpendicular precipices.

Shelter.—Amongst several hotels at Bombay may be mentioned Pallinjee's at Byculla, and Watson's, conveniently situated and open to the sea breeze. Exclusive of wine the average initial daily charge would be about seven rupees. At Deolalee newly-arrived troops jostled against those returning home are accommodated in huts, the bachelor officers living at mess. At Jubbulpore near the tents is Jackson's family hotel. At Allahabad are two excellent and reasonable hotels near the railway. At Meerut there are three establishments. At Umballa try Lumley's, and Clarke's at Lahore. At Jullundur and Umritzur there are intermittent attempts, and at other places the dak bungalow often will be cheaper, cleaner, and healthier than the self trumpeted native hotels. At Allahabad, Meerut, and Umballa officers may be elected honorary members of the comfortable, luxu-

rious clubs, and thoroughly enjoy themselves after enduring miseries elsewhere. Indiscriminate hospitality being impossible in hard times, when new faces flit so frequently, the stranger, especially the mother of a family, should drive at once to the dak bungalow. Too often the fretty, irritable weariness of travel may tend temporarily to turn the most amiable people into extremely trying guests, ever grumbling at the country, the climate, the customs, and the servants of kindly disposed hosts, who, unable to remedy matters, have their own sorrows and troubles to contend with. After a time those privileged to experience the glorious, exhilarating, dry weather of the Punjab at one season, and the fresh, cool, pure, bracing breezes of the snow-clad Himalayas at another, ought really to enjoy better health than in wet, damp, foggy, rheumatic, asthmatic old England.

CHAPTER III

UPPER INDIA

DURING the period from March, 1873, to December, 1878, duty entailed encamping at Delhi, when Lord Northbrook held a durbar, when H.R.H. the Prince of Wales danced in the ancient halls of the Great Moguls, and, lastly, when Queen Victoria was proclaimed Empress of India. Opportunities have occurred of seeing the pearl-white marble rocks near Jubbulpore, the golden temples of Benares and Umritzur, the Taj at Agra, the Kootub near Delhi, the well at Cawnpore, the Residency at Lucknow, the sacred shrines near Muttra, the pilgrims bathing at Hurdwar fair, the magnificent canals, the burning ghâts, the botanical gardens at Saharanpore, and the Lawrence Asylum for soldiers' children on the hills of Sanawar. Either on business, or else on expensive excursions, Allahabad, Meerut, Roorkee, Umbâlla, Loodiana, Kurnal, Ferozepore, Jullundur, Mean Meer, Mooltan, Lahore, Sealkote, Kussowlee, Dugshai, Subathoo, Simla, Dalhousie, Dharmasala, Dehra Doon, Landour, the tea plantations in the fertile Kangra Valley, and the lovely lake at Nyna Tai, have, amongst other places, been visited, and some described in the ' Indian Medical Gazette '—namely, Mean Meer, Mooltan, Subathoo. At Netley, where 3000 soldiers annually are admitted from all

foreign stations, my present duty, besides ward work (sometimes a daily list exceeding fifty patients), includes also medical invaliding—that is, to read over the cases, the detailed history extending over years (indeed, every document), to examine each man, and then to prepare the condensed final reports, numbering nearly 1000 since February last. Latterly, Cyprus and Zululand have contributed largely to the list, which includes some from Malta, Gibraltar, Bermuda, Mauritius, Canada, China; but from the enormous, extensive empire of India, with its every variety of soil, climate, and meteorological conditions, come the shiploads of sufferers. Of the 60,000 Europeans there quartered, the army of Bengal will alone muster 37,000, with 3500 women and 6800 children. The principal diseases affecting women are continued and paroxysmal fevers, tubercular diseases, anaemia, bronchial ailments, dyspepsia, diarrhoea, dysentery, hepatitis, uterine complaints, and general debility. Children suffer with measles, whooping-cough, malarial fevers, tubercular diseases, anaemia, convulsions, conjunctivitis, croup, diphtheria, bronchitis, dysentery, diarrhoea, debility, and difficult dentition. In my experience the type of diphtheria, scarlatina, erysipelas, measles, pneumonia, and whooping-cough, appeared far milder than at Woolwich. Diphtheria occasionally proves very deadly, even in good stations like Umballa. Diarrhoea, dysentery, and convulsions, also fill so many little graves in the sandy, burning plains, that it appears almost criminal for a practitioner to sanction any child being bottle-fed in stations where native wet-nurses are procurable. Prolonged lactation, so often required, cannot be managed by weakly English women prone

to fever and hæmorrhage. Even at the hills, where officers suffer with gout, asthma, or cardiac affections, their wives, during the rains, may be tortured by non-malarial neuralgia or debilitating diarrhœa. At Subathoo, elevated 4000 feet, and surrounded by higher hills on a clay slate and limestone formation (accountable for hard water), goitre in 1878 temporarily affected a number of European children recently arrived from malarious Peshawur, where, also, the disease may appear. More prevalent on the crests of high mountains than down below, goitre has been noted also at Simla, Dharmshala, Mussooree, at elevations exceeding 7000 feet, as well as in the great open valley of Kashmir. In the hot plains sunstroke does not appear to spare young infants; and the milk difficulties, the food decomposition, and the many conditions leading to the production of threadworms, all add fuel to the fire of fatal dysentery or diarrhœa. The newly-arrived young soldier in the plains, and not unfrequently at crowded, insanitary hill-stations, may too often be attacked with enteric, especially if exposed to the blazing morning sun, to extreme fatigue, to bad food, to overcrowding, to excessive day or night duty, or if stationed in a place annually becoming more polluted after prolonged occupation. He may escape during the first and second year, only to be mildly infected in the third. Fortunately, by hydropathic treatment with gradually cooled baths, aided by such remedies as turpentine and quinine, and above all things by skilled nursing, the mortality can be considerably reduced, and the patient returned to the ranks eventually an effective soldier. Of all diseases attacking the middle-aged, the broken-down by

climate, or the battered, drunken, old soldier, the most deadly, the most insidious, the most intractable, is dysentery. Cholera, by comparison, proves much more honest in its course towards death or complete recovery. The hills too often are of no avail. Get your patient out to sea, or still better out of the country, with despatch, and if possible do not let him return, at all events, for a long time. Be very sparing with that splendid remedy mercury in treating disease; indeed, try and do without it, except in the case of strong officers, comfortably off, blessed with common sense, and enjoying all the comforts and advantages of long leave at selected hills with scanty rainfall. The soldier in the ranks is not in a position, and cannot be relied upon, to take sufficient care of himself. The poor fellow may get drunk on a wet night, may sleep anywhere, or, in his sober senses, perhaps, sit gambling on damp grass, and thus may dysentery defiant of ipecacuanha originate, especially in stations where the water, vegetable, or meat supplies are unsatisfactory. For concussion of the brain, puerperal peritonitis, and certain acute diseases, mercurial inunctions have proved invaluable remedies. In my limited experience no local sores or ulcers, no tetanus, followed the hypodermic injection of the neutral sulphate of quinine, which answered, as a rule, satisfactorily in the treatment of ague; and if this practice became universal, the annual saving to the State might be calculated in thousands of rupees. Of course the quinine solution, the syringe, and the patient, require some very simple precautions. When potato growth becomes better understood, and native prejudice against sewage farming is overcome by financial sub-

stantial results, scorbutic diseases will probably diminish. Every year, cabbages, carrots, parsnips, turnips, cauliflowers, cucumber, beet-root, tomatoes, peas, artichokes, in some places celery and asparagus, are increasing in cultivation, if not in quality, to supplement native vegetables. Very fine strawberries and peaches at Meerut, Sealkote, Agra, and elsewhere. Most delicious tea to refresh the fever-stricken, and persons suffering from incessant thirst in an exhausting climate, can now be grown on many plantations. The quality of animal food must always be poor and extremely tough, excepting in the cool season, when for days beef and fair mutton can be kept—say at Lahore. Of the numerous edible fishes, the majority are flavourless, tasteless, as compared with venison, pea-fowl, quail, partridge, dove, hare, pigeon, or snipe of Upper India.

Some stations are hotter, with diminished rainfall—it is said, owing to forest destruction for fuel requirements. Others are more feverish, swampy, and water-logged, wherever irrigation has been conducted without sufficient reference to drainage, but, besides averting famines, the canals, supplied by the great rivers which take their rise in the glaciers of the Himalaya, create cool avenues, beautiful gardens, and shady groves in the desert, where, for months, green fields and luxuriant crops can cover the dusty soil; for instance, at Mean Meer. About the house the tobacco plant, the sunflower, maize, lemon plant, heliotrope, dill, borage, aniseed, mint, mignonette, myrtle, sage, and basil, may absorb ground poison. Drainage is attempted when practicable and local funds permit, excepting in flat, hopeless situations which cannot be abandoned. Hill retreats, improvements

in water supply, ingenious filters, cooling appliances, ice, hill beer, dry earth conservancy, rapid postal communication, and facilities of locomotion along excellent roads, are all comparatively recent undertakings. Warned by telegraph, authorities can quietly collect tents, mules, elephants, camels, coolies, cots, and in many places arrange for a whole regiment in a few hours being whirled by rail from cholera spots to isolated camps previously prepared—for instance, in the nearly rainless country about Ferozepore and Mooltan. Sick transport, sick-nursing, and cooking arrangements are matters of annually increasing endeavours to improve. Unfortunately, *something* is always happening to cripple finances and to check sanitary progress. Deficient, excessive, or irregular rain, and hill snow falls, extraordinary heat, prolonged drought, crop failures, cattle plagues, locust ravages, various blights, certain weeds, and saline efflorescence tending to soil-sterility, and the cruel visitations of variola, cholera, and malarial fevers, all retard hygienic efforts. Besides plagues, pestilence, and famine, frontier war expenses long delayed the construction of that noble and beneficent work the Ganges Canal. Earthquakes, hurricanes, dust or sand storms, thunder and lightning, heat, insects, and deluging rains, materially increase all building estimates. The tiny rivulet in the sand suddenly becomes a mighty river, furiously sweeping away roads, railway-bridges, and the hovels constituting crowded cities. As the country inundation subsides, and the vindictive sun plays upon the filthy mud, out-bursts fever, sparing no human beings—namely, at the popular station of Jullundur in 1878. Snake-

bites of Europeans are exceedingly rare. A native at Dalhousie was the only case treated by me, and near the hut a magnificent black cobra was killed. During twenty-one years' service only two instances of hydrophobia noticed. When at Subathoo in 1877, three natives in a temple were struck by lightning—one killed, the others stunned for awhile. Scorpions, wasps, and centipedes, bugs, fleas, mosquitoes, lice, and leeches, seldom do permanent injury; yet at Jubbulpore and at the hills of Puchmurree hornet stings have proved fatal to Europeans. Annually endless natives are bitten by dogs, wolves, foxes, jackals, camels, horses, ponies; occasionally clawed by tigers, bears, or cats; or else killed (on rare occasions) by elephants. Wolves, panthers, and jackals have been known to fly at the necks of sleeping children; actually at civilized Simla after dark the leopards are about. One evening at Dalhousie some infants in perambulators on the Mall had a very narrow escape of being abducted into a dense forest of firs, oaks, and rhododendra.

Under endless disadvantages, medical men on the spot are ever struggling to master the mysteries of disease, and, amongst others, the names of Ranald Martin, Morehead, Norman Chevers, and Maclean will always be associated with the sanitary welfare of India.

What with letters, newspapers, books, and periodicals, a sympathetic interest is taken in European topics by most exiles, who, hoping to return to friends and kindred, and their own fireside at home, live very carefully, and do their very best to treasure up their capital of strength, which will be taxed according to constitution, habits, luck, locality, and interest in the deteriorating climate of the plains.

CHAPTER IV

STATIONS

AGRA—About 842 miles by rail from Calcutta. Elevated 557 feet above sea level, and 50 above the Jumna, flowing beneath the red, sandstone walls and marble mosques of the fort built by the illustrious Akbar. Surface and soil composed of alluvial deposit of alternate strata of clay, sand, and lime, as kunkur. Excellent roads. City walls comprise eleven square miles of ruins, ravines, dusty patches of desert, and a large Hindoo population trading in salt and cotton. Trees are not numerous; still as viewed from any elevation the country, in certain directions, appears fairly wooded, and the Taj garden on the banks of the river contains trees, shrubs, flowers, and grasses, from all parts of the world. In 1878 locusts played sad havoc, and the hot weather tries all horticultural endeavours; still, as compared with Cawnpore, Lucknow, Benares, Delhi, Umritzur, Lahore, Sealkote, this garden at Agra, in my humble opinion, is far superior to all others. Rainfall thirty inches; about two in June, ten July, seven August, six in September, and a few drops in every other month except November. Mean temperature: January 59°, April 86°, June 93°, August 83°, October 78°; the heat and dust especially distressing at one time, yet not unhealthy to persons temperate in

all things, and able to provide punkahs and tatties, if not thermantidores. August to October are the most sickly months, when malarial fevers, cholera, diarrhoea, dysentery, hepatic disease, may prevail. November to April are comparatively healthy periods, but the wide range of temperature, the hot days and cold nights in November, require all possible precautions against insidious chills. Respiratory diseases and rheumatism specially noted in February, variola in March, apoplexy or ophthalmia in June, enteric fever in September, and phthisis in October. Well water at a depth from fifty-five to seventy feet is frequently brackish, with aperient properties, but canal projects and river purification, besides improving food supplies, will be generally beneficial. Meat, poultry, bread, and vegetables are good in cold weather, and by rail many wants can be remedied. Compared with Meerut, the bungalows with dusty compounds are not particularly good. The community includes a brigadier commanding two batteries of artillery, one regiment of European and two of native infantry, about 1156 European soldiers, 123 wives, 200 children, not including officers' families. Besides a commissioner, receiving 3166 rupees a month, a sessions and district judge (2500), a magistrate and collector (2500), a commissioner of inland customs (2750), there are numerous officials in the police, commissariat, telegraphic, public works, educational department, else connected with the various railways, not a few enjoying good pay, and, therefore, enabled to exercise hospitality if so disposed. The church, most creditably looked after, is one of the neatest, in my small experience, noticed in the plains. Laurie and Staten keep the best hotel.

There are others and a dak bungalow. The hill stations of Nyna Tal, Mussouree, and Simla, are within comparatively easy reach. In sickly times camps have been pitched in the Taj gardens about two miles distant: in the Rambagh on the other side of the river; and at Secundra about four miles out. The city, naturally well drained to the Jumna, could be improved, and the wells, which contain sweet drinking water, are few and far between. In 1875, when H.R.H. the Prince of Wales visited Agra, the sanitary arrangements of the various camps conducted on the shallow trench, dry earth system succeeded admirably. In the civil lines there is a circulating library, and at the comfortable club various newspapers and periodicals are provided. A medical school for natives has proved valuable, and the system of providing wet-nurses is a priceless boon towards diminishing infantile mortality. Shops are fair, the manufacture of ice is satisfactory, and capital drinking cups of metal are sold. Stone-cutters, besides turning out rough specimens of mosaic, are considered clever in the execution of churchyard memorials over the dead, and can accurately copy any designs. Agra, on the whole, though hot, dusty, and liable to seasonal periodic epidemics, is a very pleasant and popular station. People never grow tired of the Taj, and each visit to this peerless gem will only increase the fascination exercised by its mysterious, marvellous, indescribable beauty, especially by moonlight when the fountains play.

ALLAHABAD.—Here the blue waters of the Jumna join the turbid flood of the Ganges, about 565 miles from Calcutta, and 840 from Bombay. Elevated

289 feet above sea level, and placed on a tongue of land six miles long and four wide (the ground sandy with clay subsoil), this station is occupied by 1100 European soldiers, a regiment of Bengal cavalry, another of native infantry, a large community belonging to the railway, and many residents connected with Government offices of the North-west Province, of which Allahabad is the capital. Not a few officials receive high rates of pay ; for instance, the lieutenant-governor (8833 rupees a month), the secretary (3000), other secretaries (2800), the chief justice (5000), four judges (each 3750), the revenue commissioner (3166), the inspector-general of police (2500), the inspector-general of gaols (2083), the senior member of revenue board (3500), the accountant-general (2500), and a great number of miscellaneous appointments are worth 1800 rupees a month. The civil surgeon, therefore, ought to earn a good income. Society is mostly civilian, and, as a rule, the military do not praise this hot, dusty, expensive station, although there is an excellent club : besides capital hotels, good shops, a public garden, and miles of driving roads. The presence of a large Eurasian colony prone to early improvident marriages and heavy families of weakly children may be detrimental in inviting periodical sickness in certain months. Rainfall about thirty-five inches, ranging from eleven to sixty-two, about eight in June, fourteen in July, eleven in August and September. In August, 1878, when the rainfall was generally excessive, only seven inches registered at Allahabad. The high day temperature has varied from 71° in December to 98° in May. The low night temperature from 54° in January to 83° in June. The

mean annual temperature 78° . The mean daily range 15° . Means of maximum and minimum in shade—January 72° — 49° ; February 80° — 52° ; March 91° — 64° ; April 100° — 68° ; May 104° — 76° ; June 99° — 80° ; July 89° — 78° ; August 89° — 77° ; September, 89° — 77° ; October 90° — 67° ; November 84° — 55° ; December 76° — 48° . Mean of dry bulb 62° in January, 91° in May, 82° in August. Mean of humidity 35° in April, 75° July to September, 52° in December. The year 1878 was generally hot. At Allahabad in June the air temperature stood 110° at 10 a.m., also 118° at 4 p.m., and 102° at 10 p.m. Maximum in sun's rays 173° , and 77° the minimum. Hard water impregnated with lime at a depth from forty-five to sixty feet has not been specially blamed. The station forty feet above the surrounding country, and about sixty above the lower water levels of the rivers. According to reports one third of the station in 1860 was actually below the river level, and protected from inundation by earth embankments. Between the railway station and the city a vast excavation, noted by a sanitary commissioner in 1868 as a source of fever consequent on percolation or evaporation after heavy rain accumulation, was not filled up in 1878. On the dry bed of the rivers underneath the Fort, just at the confluence, is a favourite resort of pilgrims, who probably import pestilence. In the gaol, where sloughing ulcers, fevers, and dysentery in April have at times been treated, no cases of cholera for eight years appeared amongst the 2000 prisoners. Drainage for the European community is carefully studied, the latest inventions in conservancy plans and carts are utilised, the surface sweepings are burnt in brick kilns, and

other products are buried in waste-land pits at sufficient distance. Still Allahabad does not escape fevers or cholera, which from analysis of reports from 1827 to 1872 as regards Europeans commences about March, attains a certain climax in May, lulls in June, reappears with virulence in August, subsides in September, and commences to die out in October. In 1868, from March to August, the numbers kept up steadily, slightly abating in July, became extinct from September until the following April. Marching into camp four miles off did not answer, so the troops were sent by rail thirty, then forty miles down the Jubbulpore line, and thus the plague was stayed. The Allahabad district, with a revenue payment of 946 rupees per square mile, may be considered the most valuable portion of the North-western Provinces, and it is hoped the groves will include more peepul, tamarind, and nim trees for shade, shelter, and rain attraction. In hot seasons it is very easy to reach Nyna Tal, namely, by rail to Bareilly, then seventy-five miles (twelve to fifteen hours) of horse dak to Ranibagh at the foot of the hills, and after ten miles of comfortable ascent, either in jampan dooly or on a pony, the traveller arrives at the lake, elevated 6450 feet, and partially enclosed by a horse-shoe of mountains.

BAREILLY.—A very favourite station celebrated for carts, furniture, native tinsel and perfumes. For cleanliness, for well laid-out and ample space for commodious, well-built, barrack accommodation, and for its many shady trees, the Cantonment would be difficult to equal in the enthusiastic opinion of Dr. Planck. But the sanitary arrangements of the large city, three and a half miles distant, were complicated with

open drains and cesspools, with dirty wells and drainage ending in stagnant ditches. Some wells without covers were overshadowed by peepul trees. Elevated 470 feet, its site almost level throughout (the gradual water shed towards the Ramgunga which flows past the city), the Cantonment only occupied by European troops since 1858, is naturally well drained. The country is well wooded and fertile ; the soil composed of alluvium, with clay and sand of varying thickness from two to eight feet overlying pure sand. The water supply ample and good in wells, with a spring level twenty feet below the surface. One medical officer thought that goitre in a native infantry regiment was influenced by the drinking water, but a previous sojourn at Peshawur might more be blamed. Diarrhoea and dysentery were said to be neither common nor severe, but cholera occurs occasionally and enteric fever has attacked young, unseasoned, susceptible new arrivals from England. Rainfall thirty-nine inches, ranging from twenty-five to forty-seven. Mean temperature of air January 57° , March 73° , June 91° , September 83° , November 67° . Taking 100° as saturation, the mean humidity may be calculated as March 40° , April 31° , June 50° , July to September 75° , November 49° . Cloud proportion, taking 10° as a sky overcast, January 2.83° , April 1.16° , June 3.97° , July and August 7.49° , September 5.06° ; the remaining months serene, almost cloudless. Hot winds in certain years may be distressing, and in the cold weather thunder and hail storms occur. Bareilly, the principal town of Rohilkund (so placed between the Himalayas and the Ganges that the well-watered land is singularly

fertile), has a fine population of abstemious natives. The community includes a battery of artillery, a line regiment, one of native cavalry, and another of native infantry, besides a little colony of sociable civilians, who run up to Nyna Tal or Almorah, forty miles farther, when the plains become unbearable.

BENARES.—The majority of acquaintances always speak of Benares as a very pleasant little military station, and the celebrated city on the left bank of the Ganges is one of the most interesting to visit. Guide books tell all about the richly endowed temples; the line of masonry ghâts sending many broad steps down to the water, for persons to bathe and for charred corpses to be consigned to the holy river: the stone houses six stories high, the sacred bulls, the monkeys: the trade in toys, in brass work, and kincob, the busy traffic along the narrow streets, and the commercial aspects of religion. From all parts of India wealthy old Hindoos endeavour to avoid eternal punishment by ending their wicked lives in the sacred city, where priests, undertakers, and timber merchants, flourish especially in sickly seasons, when along the three miles of river frontage about one hundred bodies may be daily consigned to the stream after cremation. Native population in round numbers 200,000, the Brahmins in shoals. Into the various wells of knowledge or fate, bael leaves, champa flowers, milk, rice, and sweetmeats, are thrown in as offerings, and devotees drink the water used in washing the feet of the saints. Men and animals are compressed in crowded houses, in narrow stuffy streets, and through ground holes or broken flags over drains foul emanations may ascend. No wonder cholera clings to the city, but the type

is gradually becoming milder. Sea elevation 255 feet, the site fairly raised, and so long as the Ganges does not overflow or rise very high this city, which was famous twenty-five centuries ago, is seldom inundated. The surface of the country is level with deep ravines in the calcareous conglomerate. The soil is a clayey or a sandy loam, and the kunkur is utilised for roads. Except certain tracts blasted by reh, the land is fertile in producing wheat, barley, millet, pulses, sugar cane, poppies, hemp, indigo, tobacco, and vegetables. Rainfall thirty-four inches, ranging from twenty to sixty, commencing in June, and in the hot, muggy, relaxing months of July and August amounting to twelve inches.

Calculating from 1868 to 1876, the mean temperature ranging January 62°, February 68°, March 78°, April 87°, May 93°, June 91°, July 85°, August 84°, September the same, October 79°, November 70°, December 63°. Humidity January 51°, April 26°, June 52°, September 73°, November 47°. Wells are numerous and much patronised by Mahomedans, who own 270 mosques, but the Hindoos naturally prefer the river, and the quality of the water above the burning ghâts is really better until the sickly months. Small quantities of lime and magnesia carbonates noted in the well water at depths varying from twenty-five to forty-five feet according to season. Climate is hotter than the upper stations in Northwest Provinces, the hot winds from April to June are irregular and interrupted by easterly breezes. Cold weather pleasant from the end of October until the middle of March, and bracing about Christmas. Cholera commences in spring, during the rains, and at their termination fevers and dysentery may prevail

and early in the cold season hepatic derangements. The dry soil, the presence of tamarind, mango, mulberry, jack, peepul, mowha, and lime trees about the district, the imprisonment of the river between banks may be enumerated as causes influencing local salubrity. Amongst the few troops located in the suburbs three miles from the city (separated by the Burna Nuddee), much immunity from disease is traceable to their ample segregation. The garrison includes a battery of artillery, left wing of an infantry regiment, detachment of native cavalry, a regiment of native infantry, the European soldiers about 518. The remainder of the community will consist of officials connected with judicial and revenue functions: with public works, railway and educational departments: about seven, drawing over a thousand and about seven others with monthly pay approximating 800 rupees. The Maharajah of Vigianagram, the rajahs of Bhurtpore and Mynpoorie, the rich residents in the city should be mentioned in connection with the civil surgeon's income. Distant from Calcutta 422 miles, from Allahabad 74, from Delhi 466, and from Bombay 946 miles (the latter journey forty-one hours, the approximate fare ninety rupees), the holy city of the Hindoos struck me as well worthy of a long and expensive expedition from the most distant places. The hotel was clean, comfortable, and reasonable. The brass work there, reasonably purchased, looks very bright in England if periodically polished with tamarind juice. As regards the natural history of the district, interesting to sportsmen or others; the Maharajah of Benares has a preserve containing deer, antelope, pig, peacock, partridge, quail, wild and green pigeon, also

nilghai. In various tanks there are fish, such as rohoo, chalwa, a species of herring, parhin or mullet, and wild ducks are to be found at all the large jheels from six to twenty miles distant from Benares. There are various bunds also in the district abounding with wild pig, wolves, jackals, foxes, and rabbits. There is a public garden, and there are hospitals or asylums for lepers, lunatics, and the blind, besides a homœopathic city dispensary. At the Medical Hall Press is published 'On Guard,' the monthly magazine of the thrifty and healthy total abstainers.

BARRACKPORE.—Situated on left bank of the Hoogly River, about twelve miles by rail from Calcutta, with nine trains at daily command. The station, two miles long, about one broad, contains a beautiful park attached to the Vice-regal residence. Altitude, five feet above river level. Soil, clay with shallow subsoil of gravel or pure clay without kunkur. Water at depths ranging from eight to twelve feet, the quality brackish and until lately it was customary to drink surface water collected in tanks. The surrounding country (According to Dr. Crawford, Surgeon-General), low, marshy, surrounded by jungle; the trees and hedges unpruned. The rainfall about sixty inches, the climate hot, moist, and muggy, therefore, under local conditions, malarious. People living on highly elevated river banks enjoy fair health. The sewage draining into the river, here half a mile broad, is carried away by the retreating tide. Including a battery of artillery, the European troops amount to 394. Calculated from 1860 to 1869, cholera running from January to July reaches its maximum in May. Intermittent fever noticed

every month and specially high from June to October. Remittent and continued fevers highest in July. Apoplexy in May. Dysentery and diarrhoea in July. Hepatitis in October. Respiratory diseases in November. Rheumatism in August according to Bryden's oft-quoted statistics. The proximity to Calcutta, it is obvious, must beneficially affect the quality and variety of food supplies.

CAWNPORE.—A busy, bustling place, what with cotton spinning and weaving, the Elgin, the Muir, the flour mills, the saddlery factory, the trade in skins. Located on right bank of Ganges, this hot, dusty, yet fairly healthy station, is extremely popular with pig-stickers and sportsmen generally. Elevation 400 feet. Soil alluvial, sandy over kunkur. No meteorological data accessible to prove the statement that the climate, intensely hot at one season, is cold and bracing at another. During sickness in May, it has been noticed that the absence of hot winds, the consequent sultriness with muggy east wind, and a generally electric state of atmosphere, proved unsatisfactory. "The June sky was little less than a great canopy of fire, the summer breeze was as the blast of a furnace; to touch the barrel of a gun was to recoil as from red-hot iron," writes Sir John Kaye when describing the horrors of 1857. When cholera commencing in March, growing in intensity during July and August, to subside in September, attacks the troops (consisting of a battery of artillery, one regiment of European infantry, two native regiments), it has been found expedient to march out eleven miles to Rameepore, a more beneficial procedure than encamping at short distances from Cawnpore. Water at forty feet depth does

not appear injurious. Here terminates the Ganges Canal commencing at Hurdwar, flowing past Meerut, and distributing rivers, streams, and rivulets, which are gradually improving the scenery, the food and fuel supplies, the general prosperity, if not the climate of the country. The busy city will be healthier when a continuous system of drain flushing can be completed, and every day one hundred tons of sweepings are carted out for conversion into fuel or manure. There is a small club in the station, there are two hotels according to 'David's Guide,' and the community, including civilian, railway, and canal officials, exercise a certain amount of hospitality. Soldiers, unless sportsmen, are not very enthusiastic about Cawnpore. In vain the Netley Library has been ransacked for medico-topographical information for dressing the dry bones of statistics. Falling back, as usual, upon Bryden's laborious calculations, the hospital admissions of respiratory and eye diseases are numerous in March, of apoplexy in June, rheumatism in July, of intermittent fever, diarrhoea, hepatitis, and phthisis in August, of continued or remittent fevers or dysentery in September. The Ganges, ranging from 500 yards to a mile in width, is crossed by a railway bridge from whence a general view can be obtained of the scene of the never-to-be-forgotten massacre; and, amidst the roses and cypresses in the garden, will be noticed the White Angel and Cross marking the spot "Sacred to the perpetual memory of a great company of Christian people, chiefly women and children," who lie underneath.

CAMPBELLPORE.—A military post on the Indus, fifty-four miles south of Peshawur, fourteen from Attock,

and though a hot, dusty, dull, out-of-the-way, isolated, little sandy oasis, a very healthy station occupied by a cavalry regiment or a battery of artillery. No civilians, no metalled roads, scanty rainfall, tantalizing clouds, plenty of wild sheep, and in the luxuriant corn abundance of quails. Ice and other necessities procured by country carts from Rawul Pindee, and at Cambellpore people can save money.

DERA ISMAIL KHAN.—On right bank of Indus, sea elevation 600 feet with very slight slope for drainage, the country a flat, hard surface of stiff, impervious clay, without a blade of grass excepting where well irrigation supports trees, gardens, and crops. Distant 1521 miles from Calcutta. No metalled roads. Rainfall eight inches, ranging from three to twelve. The station occupied by an infantry detachment, two regiments of Punjab cavalry and three of infantry, is very hot from June to August, the mean temperature January 50°, June 92°, September 85°, November 61°. Resembling other isolated, almost rainless districts, enjoys comparative immunity from cholera. Wells from twenty to thirty feet deep with three to nine of water, containing frequently ammonia, nitric acid, chloride of sodium, alkaline sulphates, in abundance; have been blamed for causing characteristic sores personally treated at Mooltan. People who for all purposes use Indus River water entirely escape. In old dirty wells the water of a somewhat flat, earthy taste becomes offensive after standing, according to Dr De Rinzi. But for the boils, a very healthy station, and the types of fevers, dysentery, and hepatic affections are not severe.

DINAPORE.—In the Benares district on the right

bank of the Ganges, a few miles higher up than Patna, the route one continuous city hemmed in between the river and the railway. Sea elevation 212 feet. Soil alluvial clay, with a subsoil of sand over occasional patches of kunkur; the freely irrigated country, extensively cultivated and without forests, jungles, or marshes, is generally flat. Floods or droughts, scanty rainfall, mildew, blight, insects, locusts, may account for sickness and distress. At times certain localities have been under water, and when the river subsides large mud banks are exposed. Rainfall thirty-four inches. Prevailing winds from east to west, the latter, when unseasonable, injurious to palms, wheat, barley, and opium. In the hot weather, from middle of March to that of June, tatties in suitable positions are serviceable. The cold weather runs from November to March, and the climate may be described as a compromise between the damp of Bengal and the dryness of the North-west Provinces. Well-water (six to thirty feet) often impregnated with salts of lime, is not so good for drinking purposes as that of the river. What with nullahs, flat country, peculiar soil, native villages, or muggy air, the conservancy arrangements in certain months are by no means easily managed in this old cantonment. In Dr Hunter's recent accounts, Patna is described as a dirty city, the dust and mud alternating. The fruits include mango, mahwa, apple, pomegranate, loquats, figs; and amongst vegetables are cucumbers, melons, carrots, cabbages, turnips, pumpkins, beans, sweet potatoes. Cows cost ten rupees each, oxen thirty the pair, sheep twenty, and pigs one hundred the score. Besides porpoises and long-

nosed crocodiles in the river, there are edible tortoises and species of lobsters, prawns, and shrimps. In the district are hares, duck, quail, ortolans, also bears, jackals, and striped squirrels. In one year 229 deaths were attributed to wolf-bites, and 248 to snakes. The mean temperature of Patna is—January 61°, February 66°, April 86°; June 88°, September 83°, November 70°, according to Blanford. The troops consist of a battery of artillery, a line regiment, a detachment of native cavalry, and a regiment of native infantry. Some pensioners settle at Dinapore. The Patna civilians include those connected with opium, the railway, public works, irrigation, and educational departments. In the large city cholera, an endemic disease, appeared in the gaol in November, 1871, at Patna, and simultaneously in the cantonment of Dinapore, during the prevalence of easterly winds, veering round to all points of the compass, associated with a cloudy sky and variations in temperature. Variola may be severe in hot months, and fevers prevail from August to October. Dysentery, diarrhoea, rheumatism, hepatitis, respiratory diseases, calculated from 1860 to 1869, showed high rates of hospital admission in August. About 1065 miles from Bombay, 400 from Calcutta, the ancient city of Patna is historically associated with the conquests of Clive and the massacre of 200 European prisoners in 1763.

DELHI.—A very pleasant, convenient, sociable, and popular station, occupied by a battery of artillery, a portion of a line regiment, a native regiment, judicial and revenue officers, also others connected with roads, railways, and canals. Besides two hotels, an excellent dak bungalow, and numerous native shops,

there is a Parsee who sells every conceivable requirement, including the standard guide books of Keene and Harcourt to this far-famed and ancient capital of the Great Moguls. Delhi, the Rome of Asia during 3000 years, has been occupied by successive races scattered about the vicinity, and over saints, martyrs, monarchs, poets, and barbers, 180,000 sepulchres are gradually crumbling away. Of the several cities the present (250 years old) is located on the banks of the Jumna, in a basin receiving hill drainage, the neighbourhood well watered and sheltered from storms, the sea elevation 825 feet, and any difference of city elevation about forty-three feet. The country undulating, with a slope from the ridge (a prolongation of rocky hills, as it were, dying out at Delhi) to the river, and about fifteen miles from the city is a large marsh. The bridged river, half a mile wide, is a turbid stream in flood, and the bed at low water becomes a broad, sandy plain, intersected by narrow serpentine streams. The Western Jumna Canal which, entering the city at the Cabul gate, and running through the Queen's Gardens *en route* for the river, is a cut in the earth with masonry sides, and when the supply may temporarily be stopped, the sun is apt to play dangerously on the mud. The soil is generally porous near the ridge, consisting of disintegrated quartzose rock and is very gravelly; the subsoil rocky. In one excavation undertaken by Dr Penny, he found blue clay seven feet, yellow earth five, sand two, kunkur three, rock débris three; in another, *débris*, black clay, kunkur mixed with sand; in a third, light porous clay, black earth, kunkur, and smooth, light, porous earth. The remains of old cities cover an

area of twelve miles. The geological formation of the country dispenses with need of subsoil drainage, whilst intense heat and scanty rainfall diminishes any danger from the sepulchres of centuries further than the saline impregnation of the soil, not forgetting that successive races have also defiled the ground. There are excellent roads. The Chadni Chowk, the Regent Street of Delhi, a mile long, seventy-four feet wide, and planted with nim and peepul trees, terminates in the palace, almost surrounded by red sandstone walls, enclosing the double-storeyed barracks built of brick. The troop accommodation is good, and the hospital is one of the best in Upper India, but the proximity of the city is objectionable.

Besides an enormous population, many cows, goats, and buffaloes are kept in the city at night, also pigs in the suburbs, and the flies, the dust, the intense heat, all influence sanitation. The rainfall reckoned at twenty-five inches, about two in June, seven in July, five in August, six in September. In 1877 none in September, five in October; the annual total only seventeen inches. In 1875, during a cholera period, nine inches fell on one September day, washing down houses without, in any degree, interfering with the course of disease. Delhi, in many books, is said to be one of the hottest places in India, the fiery winds blowing with great fury for three or four months a year.

According to the evidence submitted to the Royal Commission in 1861, the highest day temperature ranged from 70° in December to 99° in May, the low night temperature from 50° in January to 83° in June the mean annual 78° , the mean daily range 17° ,

the prevailing winds from the west blowing over a sandy and rocky soil. According to Blanford, whose valuable treatise on meteorology dates from 1877, the mean temperature of Delhi would be—January 55°, February 58°, March 75°, April 83°, May 89°, June 94°, July 88°, August 85°, September 81°, October 75°. November 69°, December 60°. Cloud proportion—January five, April one, July six, September four; the rest of the year the sky clear and blue. In 1877, in September and October, maximum temperatures exceeding 105° were noted. According to Mr Eliot in 'Cunningham's Sanitary Report' for 1877, the humidity may be calculated—January 68°, February 58°, March 53°, April 47°, May, 42°, June 42°, July 51°, August 46°, September 40°, October 49°, November 48°, December 67°. The water-supply for years has attracted attention, in consequence of the Delhi boils or sores, attributed to the general use, for all purposes, of the well sources. The Moguls drank and cooked from Ganges water duly sealed and labelled. The boils did not trouble troops in the old cantonments as compared with others located within the city, and credit has been claimed by those who planted trees. In my humble opinion increased vegetable dietary should be honorably mentioned also. Well-water, excessively hard, contains lime, magnesia, a large proportion of nitrates and nitrites, associated with a marked quantity of chlorides, and so saline that frequently it cannot be employed to water plants, which is also the case at Mean Meer, a burial ground of the Seikhs. So long as the European troops drank out of the fort wells the sores continued. Dr De Rinzi, in his earlier reports, gives full details of

analysis and other particulars to prove the necessity for supplying the city from the river by means of reservoirs, pumps, and pipes. Wells to be sunk in the river bed, and purification ensured by natural filtration through fine stratum of sand. The river analysis very favorable. The canal, on the other hand, is polluted for miles up the stream. The distance of the brackish well-water from the surface about fifteen to forty feet. In the many camping grounds occupied during the last three meetings at Delhi, the troops, drinking out of the most convenient wells, never suffered from boils, or any sickness traceable to water, to the best of personal knowledge and research. On these three occasions the weather in the bracing, exhilarating, cold season continued very fine, yet in my tent, during the period of Lord Northbrook's durbar, the temperature exceeded 103° . It should be mentioned that at the other great assemblages the wells of sweet water were indicated by white flags, and not a few persons depended on the river. Delhi sewers, with arched tops and flat bottoms, dating from the time of Shaj Jehan, are difficult to flush, and, in reality, form a line of cess-pits, periodically opened out and cleansed. Four in the Chadni Chowk empty into one tank ; the water evaporates or soaks into the earth, and very little reaches the river. No wonder the wells are impure in a city undermined with cess-pits. It has been recommended that such sewers should be egg-shaped and ventilated. Surface cleanliness can easily be maintained, and the shallow-trench, dry-earth system of conservancy answers admirably, especially in hot dry weather. Sewage farming, and a judicious application of slaughterhouse blood, gradually

will increase the fertility of the sandy fields. Streets have been widened, houses knocked down, nuisances removed, overcrowding diminished, unsightly edifices replaced by elegant buildings ; for instance, the lofty clock tower, the railway stations, and the palatial institute containing an interesting museum with a good library in the Queen's Gardens of fifty acres. In the latter, besides a blaze of flowers, creepers, variegated shrubs, trees, and green lawns, there are birds, water fowl, a tiger, a few other animals, including bears, hyenas, wolves. There are other gardens in the suburbs, and fine groves near the old cantonments.

Delhi formerly had a bad name for pestilence or sickness, attributed to dust, flies, dirt, overcrowding, and bad water, yet, for eleven years, cholera dealt very gently with the inhabitants, and, as a rule, Europeans escape. In 1857 about 374 natives died. In November, 1871, after a funeral feast in a cholera quarter, seventy-three guests were attacked, about forty-three fatally. Just at that time troops were about commencing to assemble at the camp of exercise, and no bad results followed. In 1867 the introduction of cholera by pilgrims was a fact established beyond the slightest shadow of doubt. In 1872, a terrible year, only five deaths in the city, and no troops attacked. In 1875, commencing amongst the tanners in May, the cholera, at its climax between August and September, was not so fatal in the city of 111,000 as in the suburbs, and but eight European soldiers were attacked. The village of Azadpore, four miles from the city, specially suffered, and it is stated that the low-born tanners owed their perfect immunity to avoidance of certain wells patronised by

the higher castes only. About 500 cats infected with round or tapeworms died, it is believed, of cholera.

Variola running on from January to June may be severe in March or April, and in 1877 might have been connected with the insanitary condition of a ditch between the fort and Selimgur as regards drainage. In 1878 cases again occurred. Intermittent fever troubles every month, especially September and October; remittent or other fevers in May; apoplexy June, July; dysentery in August; diarrhoea in July; respiratory diseases July, August, December, and phthisical cases break down during the heat of June; rheumatism every month, especially January and February; eye diseases April, August, November; and ulcers in March. According to ancient annals, fevers are prone to cerebral and typhoid complications, and dysentery may be associated with hepatic abscess. Children die of remittent fever, convulsions, tabes, or diarrhoea. On the tablets of the dead on the memorial at the Ridge it appears that from May 30th until September 20th, 1857, about forty-six officers died, either from injuries on the field of battle or else from cholera, dysentery, sunstroke, or fever, aggravated by heat and exposure. The rains did not commence until June 27th. A wonderful place is Delhi, and none of the numerous books can do justice to the historical archaeological or descriptive details.

FEEROZPORE.—A small, hot, isolated station on the Sutlej, historically associated with the names of Runjeet Singh, Lords Auckland, Ellenborough, and Hardinge, Generals Nott, Sale, and Pollock, and with disastrous victories. Sir Henry Lawrence rebuilt the town, improved the streets and public buildings.

“For 100 miles on every side the country is a sandy level, indeed, we are but four marches from the desert. The soil, where sufficient exists for culture, is too shallow to admit of trees. We suffered much from cold for three months, and then the heat was excessive. We were obliged to keep out the light or let in the wind which was always blowing and bringing either rain or dust.” Thus wrote Lady Lawrence, one of whose children contracted ophthalmia from the glare reflected from the barren ground. In 1840 husband and wife spent the hot weather at Ferozepore. A house, a real house, was obtained in the cantonment, and they were able to escape from their fiery furnace in the fort of mud and bricks, which had neither windows nor fireplaces, and the doors closed very badly. In 1841, when prostrated with fever, Sir Henry rallied so soon after his removal to Subathoo that he volunteered for service in the Punjab within a fortnight. The station, elevated 720 feet above the sea level, is three miles distant from the river, and fifty from Lahore on the other side, a journey during the rains so objectionable that it might be necessary to drive seventy-six miles to Loodiana for the rail, and thus avoid the long bridge of boats and tedious sand wading. Marching with artillery from Delhi to Lahore, via Ferozepore instead of Jullundur, we had not to cross the Beas in addition to the Sutlej. The nearest hill is Kangra (2400), ninety miles distant, backed by Dharamsala (6000) and ultimately by bare granite peaks from 14, to 16,000 feet. The soil at Ferozepore is alluvial, with a large proportion of sand. It is very permeable, and rain water disappears very rapidly by percolation. Solid filth products

are carted away and the liquid absorbed by the porous soil. According to Sanitary Report for 1868, the city well-water has a greenish tint, becomes offensive in hot weather, and may contain animalculæ or leeches. Every well contained nitrous acid, sulphuretted hydrogen, and nitric acid mostly. The nature of the soil renders the water liable to be contaminated with surface drainage. Other accounts of cantonment wells are very satisfactory at depths from twenty-three to twenty-five feet. Dr De Rinzi, suggesting that river water could be introduced to the city by gravitation from a spot two miles above the town, states that he failed to discover any trace of ammonia or nitrous acid in the Sutlej, which exhibited only five degrees of total hardness, and contained less than two grains of sulphate per gallon. The rainfall is about fourteen inches, but McLelland in his 'Medical Topography of Bengal,' states twenty-three, and records the monthly mean temperatures as—January 55°, February 62°, March 72°, April 84°, May 92°, June 97°, July 88°, August 93°, September 94°, October 86°, November 70°, December 61°. The prevailing winds in the western plains are northerly from October to February, when hot westerly winds set in and continue until June, they then become variable until October. According to other authorities, the high day temperature is 72° January, 106° June; the low night temperature 47° and 84° in corresponding months; the mean annual 78°; the mean daily range 22°. In the palatial, double-storeyed, red-brick hospital the heat is at times intense. At the arsenal the 800 natives employed eight hours daily were said as a rule to be fairly healthy. The medical history of the past is very

favourable. In 1861 no cholera, in 1869 and 1872 just one doubtful case. In April 1867 heat apoplexy was followed by cholera traceable to importation (and in no way associated with diarrhoea in the early stages); it attacked fatally a few healthy temperate men. Of seven women, four of whom were pregnant, not one survived; no patients contracted disease in hospital. In other years diarrhoea in sickly months attracted notice. According to Cunningham's report for 1877, fevers are attributed to malarious emanations. During the last few years irrigation canals have been opened out around the city, and extend for thirty miles over surrounding country. The canals only flow when the Sutlej is in flood, and their waters are mostly exhausted on the surface before they reach the river again. The country may be inundated by rain-water floods or the caprice of the river. The type of fever was extremely severe in 1878. Small, hot, dry stations as a rule are popular. The community includes a line regiment, two batteries of artillery, a native regiment, a detachment of cavalry, a few civilians, besides canal and arsenal officials. In the church are memorials of the battles fought. The city, about three miles from cantonments, is connected by a good carriage-road flanked on each side by rows of shady trees, and at the city end by a long strip of public gardens. There is a small book club library, and a Parsee merchant. It is hoped that eventually the rail will be extended to Ferozepore.

FUTTEHGURH.—As an Indian station in the plains, is said to be a pleasant place to live in, and possesses a well-merited character for healthfulness. Sea elevation 550 feet; placed on the banks of the Ganges,

well raised above the river bed ; the soil alluvial sand, with a substratum of kunkur, in places succeeded by clay ; the country flat, well wooded, and, where not damaged by reh, remarkable for luxuriant vegetation ; the gardens numerous and productive ; the roads metalled with kunkur ; the water perfectly sweet. The Ganges, a mile broad during the rains, dwindles to 300 yards at other seasons when flowing through the white sand beds. The wells forty-five feet deep on the left, and twenty on the right bank. Is about 700 miles from Calcutta, 184 from Delhi, and 3 miles from Furrackabad, an enormous city, less prosperous than places touched by the railroad. When cholera appears the station, without any quarantine or special protection, may escape. Natives suffer from skin diseases, occasional goitre, and malarious fevers. Provisions are reported good. Community consists of an infantry detachment from Meerut, a native infantry detachment, a few civilians, a few officials connected with opium, indigo, or gun-carriage factory, and some native tent makers. There is a club, a library, a public garden. Rainfall twenty-eight inches, ranging from nine to thirty-four. In May the thermometer in shade may reach only 112°, in June 117°, and Dr Murray Thomson's reports would appear to confirm the opinion of Futtéhgurh being a satisfactory station.

FYZABAD.—Occupied by a line regiment, a battery of artillery, a native cavalry detachment, a native infantry regiment, and a few civilians, who all like the place until compelled, by sickness, to take the train away. Is ninety miles from Lucknow, and, unfortunately, in the vicinity of sacred groves and shrines of extreme interest to Hindoos and monkeys.

Fyzabad is situated on a site bounded on three sides by the Gogra river, and the natural drainage is perfect. Pilgrim fairs periodically take place, the visitors numbering 600,000 in April, 1877, when fifty-six were crushed to death at a favourite bathing ghat. The month of April marked the commencement of cholera in 1860, 1864, 1870, if not in 1872, a bad year. In 1878 an epidemic occurred. Enteric fever also has somewhat severely fastened on those susceptible, and, preceded by febricula or tonsillitis, proved to increase in intensity from April to June. Variola most marked in May, intermittent fever in July, apoplexy in June, dysentery in August, diarrhoea in April, hepatitis in July, respiratory diseases in July, phthisis in September, rheumatism in August, eye diseases in April. Enteric fever may be severe in January and May. Very few admissions in June, the month in the middle of which the ground water would be at its lowest level, and in the end of which it should begin to rise. The country lies low, abounding in irregular marshes, in some places a continuous chain of several miles. Rice crops require excessive irrigation, and the cultivators object to drainage.

HAZAREEBAUGH.—A station in Chota Nagpore, about 190 miles from Benares, 112 from Calcutta, and a night's dak from the rail. Is neither altogether an elevated plateau nor does it contain high hills, but both features are encountered. The formation includes a high central plateau, a lower plateau, and a valley. From 'Hunter's Statistics of Bengal,' and other books, it would appear that the general aspect of the country is pleasing. The rich red of the tilled soil contrasts well with the varied colours of

the tree foliage, the greyish green of the jungle grass, and the dark rock which crops up at intervals. Elevation 1900 feet, the table land about forty miles long from east to west. The soil a ferruginous loam and clay, with a mixture of sand and gravel, containing gneiss; the subsoil also gravel, and, deeper still, black earth. Within a few miles are five small conical hills, of volcanic origin, amidst jungle occasionally frequented by tigers, bears, or leopards, and about sixty miles distant is the isolated hill of Parasnath, elevated 4569 feet, and celebrated for its Jain temples. The soil, generally porous, does not retain surface moisture; water either runs off or percolates it, but in certain directions this soil is wet and water-logged. Beds of iron ore, coal, mica, copper, and slate, are found in the vicinity. Including potatoes, every description of vegetables, almost every variety of fruits, and flowers will flourish here, where blights and floods are unknown. where running streams feed green pastures, where, also, the mango, teak, pepul, mowha, cotton, and, with proper care, the sal, amongst other valuable trees, will grow. Tea plantations require a more equable climate with heavier rainfall, and the coffee blossom is destroyed by the hot north-west wind. Bursting through the gneiss rocks and bubbling sulphuretted hydrogen, are mineral springs, ranging in temperature from 169° to 190° (or else 75° in the morning to 84° in the afternoon in other directions), and recommended for local application to cutaneous diseases. Rainfall about fifty-two inches. The temperature considered 6° to 10° cooler than the plains; the heat of April and May mitigated by thunder, rain, and hail. According to Dr Wool-

house, the thermometer sinks below freezing point from November to January ; the hottest weather is seldom distressing in-doors, and punkahs, in many houses, are never required. Maximum shade temperature in May 107°, minimum 70°, mean 89° ; minimum for the year 37°, and the daily range about 19°. Mean monthly temperature—January 61°, February 65°, March 75°, April 83°, May 86°, June 82°, July 78°, August 77°, September 77°, October 73°, November 67°, December 61°. Dr Holton preferred Hazareebaugh to Darjeeling for certain constitutions. Well-water in 1860 found at the depth of twenty-five to thirty feet, and during the rains filling up to within ten feet of the surface. No recent analyses are accessible to prove the saline qualities attributed to the water. Rheumatism and infantile diarrhoea not uncommon, whilst malarial fevers are not virulent away from the Terai ; no leprosy or goitre, but, according to Major Scone's report, variola is started by native inoculators. Formerly aloe hedges obstructed ventilation, and rice fields near the barracks favoured fevers, and yet regiment after regiment liked the place, until enteric fever, fastening on those susceptible, necessitated reduction of troops to a detachment. A number of sanitary improvements followed, and since 1874 scarcely any enteric returning, it was considered safe to locate more men. According to latest information 900 soldiers are quartered at Hazareebaugh, which has regained its good character. Remittent and continued fevers, with cerebral complications, doubtless will periodically recur. In the 'Indian Medical Gazette' will be found detailed information about the cases of enteric in the 63rd regiment in its first

year of service. From 1860 to 1869 (*vide* Bryden) cholera admissions and intermittent fevers were high in August; remittent and continued fevers in October; rheumatism, dysentery, diarrhoea, and hepatitis, in July; respiratory diseases and phthisis in May. At different times attempts were made to utilise Parasnath, recommended as being 16° cooler than the plains, likewise free from insects and general discomforts: and invalids were sent up. Difficulties connected with space, exercise, recreation, and water-supply arose after other knotty questions associated with temples and land tenure had gradually been settled, so the benevolent scheme was reluctantly abandoned, and the double bungalow, with other buildings, were given up. Instead of 500 men, as expected, only about eighty could be accommodated. By all accounts the general society at Hazareebaugh may be very sociable.

JHANSI.—A revenue circuit, and since the mutiny a military station in the North-west Provinces 142 miles south of Agra, 130 north of Saugor, 165 west of Allahabad, and occupied by a line regiment, a detachment of native cavalry, another of infantry. Here the massacre of seventy-five Europeans in June, 1857, was avenged in March, 1858, when Sir Hugh Rose defeated Tantia Topee, and invested Jhansi, one of the strongest fortresses in Upper India. In May the soldiers marched and fought for sixteen hours with the thermometer at 115° in the shade, and pursued the rebels for eight miles. About the cantonment the land is rocky, hilly, barren, scarcely any trees, just a few stunted shrubs, but near the two rivers, and in that portion of the country immediately surrounding the large lake north-east of the native city, the

scenery improves. This fortified city is surrounded by a strong stone wall furnished with nine gateways. The westward corner of the city site is a high rock, on which the stone fort has been built in the most commanding position. The deep wide-spread collection of water called Luchmee Tal, an extensive lake containing water nuts, lilies, fish, and tortoises, attracted the attention of Dr Planck, the Sanitary Commissioner, who had never in the neighbourhood of any city seen a water-logged and flooded place like this, a place so likely to cause dangerous sickness in a large community. The natives replied that any improvements might drive away the snipe. The elevation of the cantonment is about 940 feet. The soil being rocky and gravelly, with a substratum of quartz and granite, heat is retained and thrown out to a much later hour after sunset than if the soil were earthy. Native sickness was attributed to intense heat, the radiation from the rocky soil, and brackish water. The wells for European troops were deepened to the extent of fourteen feet through the solid rock, and the quality of the water is said to be excellent. Rainfall about thirty-four inches: June 3°, July 13°, August 9°. Mean temperature—January 61°, March 78°, May 94°, July 83°, October 78°. The high shade temperature in May ranges from 104° to 117°. Respiratory diseases and phthisis exhibit most hospital admissions in January; rheumatism and eye diseases in February; apoplexy in June; cholera, dysentery, diarrhoea, and hepatitis, in August; intermittent and remittent fevers in October. At Mean Meer the opportunity occurred in the 63rd hospital of comparing the climatic effects of Hazareebaugh, Nowgong, and Jhansi, on different men, leading to conclusions

unfavorable to the latter as regards severity and persistency of malarial fevers. The station of Jhansi is about two miles from the city, and amongst other causes of sickness alternations of temperature are blamed.

JURBULPORE.—In the old days Jubbulpore was reckoned as one of the pleasantest of Indian stations: situated in a green hollow, among low granite hills always covered with verdure, with tidy hard roads and plenty of greensward: with commodious bungalows embowered in magnificent clumps of bamboo: remarkable for the delicacy and abundance of its fruits and other garden products, including pineapples: and a most absurdly cheap place to live in. *Vide the 'Highlands of Central India,'* by Captain Forsyth, who goes on to say that the agriculturist and the merchant have gradually prospered, whilst the general expenses of those on fixed incomes have seriously increased. Other writers describe Jubbulpore as situated at the base of a rocky hill, about a mile from the right bank of the Narbada River fordable in that place in the season of low water, when it is three feet deep and 300 wide. There are small lakes and tanks, which swell in the rains. The range of hills overlooking the town is granite of several kinds, and every subordinate formation, including gneiss, hornblende, schistose rocks, dolomite, will be found in the neighbourhood. Various sanitary reports allude to the granite outcrop on or close to which the station has been built, the sandstone to the east, the deep, porous alluvium resting immediately against the granite and extending far to the north and west as a low, flat, and ill-drained plain, with water remaining for months close to the surface,

and then rapidly falling, till the subsoil level is about seventeen feet. A large number of tanks were supplied from rainfall, surface drainage, and springs, some above the level of surrounding houses. At the Marble Rocks, ten miles from Jubbulpore, the deep and blue Narbada for two miles flows between two radiant, snow-white walls a hundred feet in height. In places the saccharine limestone is seamed by veins of dark green or black volcanic rock, and singularly lovely is the picture produced by the river, the tiny islands, and the marble cliffs, against an azure sky. As the boat passes through the gradually contracting gorge the soothing sound of water, the splashing of oars, the hum of bees, the chattering of monkeys, and the rustling of forest trees, fall curiously on the ear, wearied by the monotony of city or cantonment, noise or silence. The town and station of Jubbulpore lies in a basin, the soil sandy and porous, the natural drainage slow and imperfect. In the hot weather of 1869, wells fifty feet deep ran dry, until only one remained to every 1000 persons, at a time when cholera was raging. From the porous nature of the strata, it follows that percolation from the surface is rapid, and the wells near dangerous tanks may be contaminated, partially accounting for outbreaks of cholera, malarial fevers, and virulent variola. Elevation 1386 feet above sea level. Average rainfall sixty inches. Mean monthly temperature in 1877 ran—January 61°, February 64° March 75°, April 79°, May 85°, June 87°, July 82°, August 79°, September 80°, October 75°, November 68°, December 65°. Humidity—January 68°, February 66°, March 54°, April 53°, May 46°, June 44°, July 75°, August 80°, September 76°, October 72°,

November 66°, December 72°. Temperature is raised by reflected sun heat and rock radiation.

The station is not exposed to cold or variable winds and the climate is considered equable. Water in 1860 was described as alkaline, soft, also frequently impregnated with iron, and the wells were generally clear of trees. The tanks contained duck weed and fish. In 1877 the depth of subsoil water was eight feet in January, thirteen in June, seven in August, and five in October. That year malarial fevers and measles prevailed. "Near the native infantry lines swampy bed of an old nulla noticed, and swampy ground during the monsoon on the east, south, and south-west of European lines. Wells said to be liable to contamination by refuse matters carried into them by the wind, and also by percolation from a tank near which sewage was formerly deposited. Overcrowding in native lines, and high price of food, said to have acted prejudicially on health of native troops," according to the Sanitary Commissioner. Jubbulpore being placed in a basin partly surrounded by hills the force of the winds will be broken, and the lower velocity is consistent with oppressive heat. In 1877 the monthly mean of daily horizontal movement (in miles) was registered as—January 41, April 72, May 47, July 135, September 90, November 45. The mean of wind directions—north-east in January and February, westerly in March and April, even on to September, alternating with north-westerly winds, and from October to December north-east, east, and south-westerly most prevalent. The diseases of the different months, calculated by Bryden (who points out that the district is apt to come under the influence of spring cholera in any year), are rheumatism and

variola in March, ophthalmia in April, apoplexy in June, diarrhoea and dysentery in August, hepatitis, phthisis, and respiratory diseases, in September, intermittent and remittent fevers in October. The admissions to hospital from fever amongst British troops per 1000 were 659 in 1871, 229 in 1872, 240 in 1873, 334 in 1874, and 468 in 1875. Sugar-cane and rice cultivation at times blamed, and besides swamp drainage it has been recommended to plant acacia, sirrus, eucalyptus globulus, and other quickly growing trees. The results, however, of attempts made to grow the blue gum tree in the hot swampy plains so far are not encouraging. Amongst other causes of sickness the usual difficulties, the want of system and supervision in sewage disposal, are reiterated in reports. In some localities selected for burial of ordure the site is rocky and the soil between the boulders loose porous sand, with feeble deodorizing properties. Dr Townsend describes the Jubbulpore district as overrun periodically by epidemics of cholera and variola. Malarious fever is endemic generally, and in special localities annually prevails with severity. Varicella periodically recurs. Although a frequent visitor about June cholera rarely attacks either troops or prisoners with great severity. The years 1856, 1857, 1863, 1869 to be noted. In 1868 the rainfall was twenty-five inches below the average of eighteen previous years. In 1869 the mean daily temperature registered—April 84°, May 96°, June 93°. Owing to excessive drought the crops failed, especially rice, and natives had to subsist on fruits, roots, and jungle produce. That year variola, redeveloped in the previous December, attained a maximum of virulence in April,

then gradually declined to relapse slightly in December. Water analysis at one time proved the supply to be good. Periodical cleansing required, and the presence of turtle objected to.

Dr Whitwell, in 1871, found ammonia and nitrous acid in several wells used by Europeans. The Narbada, used by the natives for all purposes, had a brown colour, a saline taste, an alkaline reaction, with $3\cdot3^{\circ}$ of total, $2\cdot3^{\circ}$ of permanent, and 1° of removable hardness: containing neither ammonia, phosphoric, nitric, or nitrous acid, about $4\cdot40$ mineral matter, $3\cdot60$ earthy salts, $1\cdot10$ of lime carbonate, $1\cdot35$ silica, with small quantities of soluble salts, chloride of sodium, sulphate and carbonate of soda. Rising in high table lands, composed of gneiss and sandstone, flanked at intervals by coal measures, this sacred river for 200 miles winds among hills, then at Jubbulpore, passing through the marble rocks, it enters between the Vindhyan and Satpura ranges into its proper valley, and pursues, for 500 miles, a westerly course to the Gulf of Cambay. Ugly turtles, monstrous fish, and repulsive crocodiles pollute the stream. Marching in the district in certain months must be very enjoyable, with a climate almost perfect, the mornings and evenings cool, the midday sun not too hot, and the nights cold enough for blankets. Forsyth tells of snipe, wild fowl, the common teal, the whistling, the blue-winged teal, the widgeon, the pintail, the mallard, the grey, the black-backed goose, the storks, herons, and cranes, the grey quail, the common grey partridge, the painted partridge. He also mentions the black antelope, the ravine deer, the nilghai, the tiger, the panther, the bear, the hunting leopard, the wolf, the

jackal, and the mighty boar. For information about the green hills of Puchmurree, the distant forests, the sal, the teak, the bamboo, and mhowa trees, and about the labours of Sir R. Temple in the Central Provinces, the reader is referred to Forsyth's most interesting book. Surgeon-Major Staples has also written a medico-topographical report on Puchmurree. Jubbulpore is generally liked as a station, and regiments sick elsewhere have there improved. The garrison consists of a Major-General commanding Saugor District, his staff, a line regiment, a detachment of native cavalry, a native infantry regiment. Civilians are connected with judicial or revenue functions, with public works, education, and railways, with the gaol, and school of industry, where Thuggee is diverted into tent and carpet manufacture. Trade includes lac, dye, opium, jute, grains, cotton, salt, and the mineral resources, especially coal and iron, have long attracted attention. There are two hotels. Jubbulpore is 116 miles from Saugor, 229 from Allahabad, and about 616 from Bombay, the latter distance a little greater than from London to Inverness. In the books of Sleeman and Meadows Taylor will be found curious and sensational accounts of the Thugs in the Saugor district.

JULLUNDUR.—The capital of the Jullundur Doab, the garden of the Punjab, a fertile, richly cultivated, well-wooded tract of country between the Beas and Sutlej rivers; the station situated in a plain having no large river in its immediate vicinity, and about 100 miles distant from the Himalayas, which are visible in clear weather, especially the snow patches and sharp granite peaks overlooking Dharmasala; the surface a perfect level, so that natural and artificial

drainage is difficult, the sandy soil rapidly absorbing rain, in certain directions at a depth of thirty feet, succeeded by beds of stiff clay. The cantonment is three miles east of the town, the suddur bazar is too near the barracks, and certain tanks or excavations may be connected with fevers and rheumatism. This pretty green station, open to all the winds that blow, is conveniently placed about a mile from the railway running down to Umballa 107 miles, else 85 miles up to Lahore, through Umritzur. Elevation 937 feet. The slightly elevated city, dating back to the Alexandrian period, has been described as a collection of filthy mud hovels, narrow tortuous streets, and blind alleys, overcrowded and extremely offensive, with a population of 85,000, mostly a pale, under-fed, poorly-clad set of people, with enlarged spleens, bloodless gums, blanched faces, and jaundiced eyes, not a few at work when burning with fever. In years of late and heavy rains the crops could not be reaped, as there were no hands to cut them.

In 1875 water flooded the country outside the city walls for twenty days, the lake depth ranging from three to nine feet, and as the sun played on the filth-polluted, drying-up ground, 500 fever-stricken natives died in one week. In August, 1878, about sixteen inches of rain fell in thirty-six hours, the small streams temporarily became deep dangerous rivers, in their fury sweeping away embankments, bridges, houses, the railway line, and telegraph posts, so that it became necessary to depend upon elephants for purposes of communication until wheel carriages could be utilised. History repeated itself in the matter of succeeding fever. As a rule, water is found at a depth of sixteen to twenty feet, and of

the 500 city wells, when the soil becomes water-logged, the majority are unsatisfactory. The rainfall was 18 inches in 1873, 23 in 1874, 55 in 1875, 27 in 1876, 39 in 1877. The climate is cooler than that of Umballa, and in many respects better than the average of plain stations. The heat and dust only distressing for a short period. The cold weather is extremely enjoyable and the hill panorama exceedingly beautiful. Snow has fallen. The drainage river incline has a fall of two feet per mile. Conservancy pits about two miles from the barracks are left quiet for twelve months, and eventually the ground is turned into wheat fields. There are excellent roads, shady avenues, and what with babul, sheesum, mulberry, neem, orange, lime, mango, and occasional pine trees, most charming groves. Palatial is the appropriate designation of seven double storeyed barracks built (in 1870) of red brick, with slate roofs and flagged floors, to accommodate 228 men, the length of one being 382 feet, that of others 200, arranged en echelon 135 feet apart; the upper rooms chiefly intended for occupation. Verandah width about twelve feet. In the infantry lines also there are nine single storeyed barracks, and two for married families, erected in 1848 and 1850, built of sun-dried brick, with thatched roofs and brick floors. The artillery barracks and the native lines have each their own distinct and separate locality on the flat plain. The barrack water-supply appears ample and good. In the infantry lines there is a magnificent swimming bath of graduated depth.

In the suddur bazar, containing a population of 5000, the provision supplies are convenient. Edible singhara nuts, amongst other aquatic plants, grow

in tanks. Calculated for a series of years, the most prominent hospital admissions ran—diarrhoea in April, dysentery and phthisis in May, variola and respiratory diseases in June, apoplexy, hepatitis, and rheumatism in July, cholera in September, intermittent fevers in October, as compared with remittent, and continued in June. Mild outbreaks of cholera noted in 1857, 1858, 1867, 1868, 1872. The 54th regiment, which arrived from England in December, 1871, lost six men, two women, and four children, between the dates of August 21st and September 30th, 1872. Eight different barracks were attacked (five old, two new, and the hospital), and ten barracks escaped. Heavy rains preceded the outbreak, which continued during still, sultry, muggy weather. Quarantine only increased general distress in the district, and native women preferred death in their mud hovels to the disgrace implied in removal to cholera hospital. From May to August, and onwards, the 92nd regiment in 1868 suffered with enteric fever originating within the regiment itself, and supervening on an outbreak of diarrhoea, which commenced on the voyage up the Indus amongst the young children, extended to the larger children and women, and lastly to the men, especially to young weakly recruits, who, as usual, felt the heat excessively on first arrival: no special prevalence of enteric at the time affecting seasoned residents.

In December, 1877, the Royal Canadians arrived at Jullundur from home, soon to suffer severely in 1878 with typho-malarial fevers, which proving terribly fatal to many men, women, and children, yet spared the officers. Before the floods commenced the 100th were sickly, and even in December matters

continued so serious that it became necessary to remove this fever-stricken regiment to Sealkote, where they gradually improved. Society at Jullundur includes a battery of artillery, a line regiment, a detachment of native cavalry, a native infantry regiment, and a few civilians, mostly scattered at inconvenient distance. There is a fair public garden, a small struggling hotel, a dak bungalow, a humble library or club, where people meet of an evening after badminton or lawn tennis in private gardens, and also an obliging Parsee merchant. Along the mall and various roads equestrian exercise may be enjoyed on the green turf under sweetly scented flowering trees. But for periodic outbreaks of flood fevers Jullundur would be one of the most coveted stations, especially by sportsmen. A pleasant march of one hundred miles is it from Jullundur to Dharmasala, via Adampore, Hoshiapore, Guggret, Burwein, Dera, Raneetal, and Kangra. There are dak, road, or civilian bungalows of shelter for travellers without tents, and occasionally provisions are procurable.

Adampore, the nearest camping ground to Jullundur, was in November, 1878, an open field, somewhat hot after a morning temperature of 40°. Hoshiapore has a well-wooded park, a smooth, green lawn, with ample tent space, but in a dry season insufficient water supply for numerous men. About five miles off commence the comparatively little hills. A good dak bungalow in a pretty garden, a few private houses, and a dirty city, a mile from camp are then noticed. Guggret is elevated 1150 feet above sea level, the road is indifferent, and the flat camp close to a small bazaar and without shade. Still worse is the toil up to Burwein, about fifty

miles from Jullundur, and elevated 3000 feet. A cool refuge amongst the fir trees, with a truly magnificent view of the mountains, and even of the houses at Dharmasala, fifty miles off. The tiny camp is a succession of narrow ledges or steppes most inconvenient for bullock carts. There are three houses, one supplied with stores and books. The well, fifty feet deep, contained ten of water. The path next descends to the Beas, crossed by a bridge of fourteen boats, to reach Dera remarkable for an exquisite combination of river, forest, and mountain scenery. The temperature of the broad, pellucid stream, noisily flowing over the glistening sand and bright pebbles, 200 feet below the dak bungalow, was 55° at 10 a.m. to 79° of the outer air. Excellent mahsia and rohoo fish to be caught, and either on mussack rafts or timber logs it is easy to undertake shooting excursions down the river. Curious hot and cold springs in the neighbourhood, and about eleven miles from Raneetal (a bad road) are the celebrated naphtha flames issuing in jets from the rock in the ancient shrine at Jawallamukki. On a dark night, escorted by a torch-bearer, it was my fate to walk back to camp alone, as the dhooly bearers had no reliefs for return journey. Near the temple are iodide of potassium and other mineral springs, fully appreciated by natives afflicted with rheumatic or other ailments. The fertile Kangra Valley with its rice fields and tea plantations require detailed description. The fort, elevated 2550 feet, in ancient days stood many a siege, for "he who held Kangra held the hills." Above the valley rises the well-wooded Dharmasala (6000 feet), backed by a granite wall of 16,500, with too great acclivity for snow to

rest upon. From Jullundur it is easy expeditiously to reach the Simla group; by train to Umballa, drive to Kalka, tongha onwards. Or else train to Umritzur, gharry to Pathankote, dhooley up to the Dalhousie hills. All things considered, Jullundur can be highly recommended, as the fever-producing floods or inundations do not frequently occur.

KOHAT.—An important station to the south and south-west of Peshawar, forty miles distant, and separated by a range of hills with communication over the Kotul; along the east and south-east bounded by the Indus. The rugged district consists of barren hills with cultivated valleys between. The cantonment, an amphitheatre, apparently a green oasis, while the surrounding country presents one monotonous stony aridity, hardly relieved by small patches of sparse sickly cultivation, and but for canal cuts or irrigation the general aspect would be uniformly dismal. City population of 6000, located near native troops consisting of two batteries, a regiment of cavalry, three of infantry; the different lines on a ridge extending in a semicircular direction from north to south, almost enclosing the city, 500 yards away on lower ground. The cantonment formerly a grave yard, and as enteric fever latterly increased amongst Europeans the wells were blamed. Sickness appeared connected with the usual filth pollution of air and water, especially by decomposing animal and vegetable matter, by dirty stagnant ponds, mills, swamps, and green ditches. Bad smells prevalent in hot weather. Ground surface is gravelly, with a subsoil of stony conglomerate. Vegetation and trees grow along the water-courses. A fine spring, issuing near a village, runs 250 yards, then divides into three

streams. Until a covered duct was made in 1872 the open channel was unprotected. Four rivulets ran through gardens, cemeteries, else under peepul tree roots, to terminate in a central reservoir. Careful persons send mules with musselsacks to the spring-head. Apathetic natives drank from a dirty river branch. In many wells water emitted an odour of sulphuretted hydrogen after standing a single night. Solid refuse is carried by donkeys to distant fields for manure.

The rainfall ranges from fourteen to thirty-five inches, but there are no meteorological or health statistics for prolonged periods. With its west end open to a valley, the town receives nightly a cool sweet breeze to flush it thoroughly. In August, 1872, a gale of wind uprooted trees and blew away part of the solid brick roof of the hospital. Heavy rains were followed by bright sunshine, with successively sultry and oppressive weather succeeding. Outbreaks of fever not uncommon. Cholera specially noted in 1858, 1862, 1867, 1869, 1872, commencing generally in August, to subside in October. When the night duties are heavy the troops suffer. The community included four civilians, two engineers, and a few other officials. Major Conran in his 'Autobiography,' describes Kohat in 1854 as a pretty little station of fairly built houses, several surrounded by fields, orchards, and gardens. The valley well watered, and the little town of mud huts looked prosperous. Amongst the thirty Europeans fever was attributed to rice culture. In the cold weather, the lofty mountains were sublime in their winter vest of snow. Another station, Bannu or Edwardesbad, appeared to require a better supply of drinking

water to diminish endemic diseases, such as diarrhoea, malarial fevers, *tænia*, dysentery, calculus, and goitre. One cannot travel much in India without hearing endless praise of the sociability and the hospitality of the Frontier Force, who, as a rule, taking a Mark Tapley view of things, contrive to make themselves exceedingly comfortable at Bannu Kohat, or wherever their tents are pitched.

KURNAL.—The dismantled church, the low thick-walled barracks, turned for a time into stud stables, the roofless bungalows, the jungly compounds, and the seats on the deserted mall, all remind the very few resident civilians that Kurnal was an important place until pestilential fever compelled the troops to leave for Umballa in 1843. Solitary cells, into which delinquents had to crawl on hands and knees, are still shown. There are memorials of the 43rd N.I., the 1st Bengal Fusiliers, 3rd and 4th Dragoons, 13th and 31st Foot, and in the cemetery sleep not a few of the fine old Bengal Artillery. As usual, marble tablets have been abstracted for curry-stone requirements. The red-walled town contains a population of 25,000, about twenty-five potter's kilns, fifty-four burial places, 147 wells (mostly containing unsatisfactory water), and enormous herds of cattle. About 200 yards from the town is the Western Jumna Canal, about seven miles from the river. By raising canal embankments the broad stream flows many feet above the level of the surrounding country. The canal, originally constructed by the Delhi emperors on the site of a natural water-course, only carried a very small volume of water. Dr Bellew in 1877 noticed ditches, which, when full or rain-flooded, had to be emptied by bailing out

contents into the higher level canal, and, owing to the unfavorable nature of the surface, it seemed impossible to carry town drainage away. Hence accumulation, stagnation, rain-ponds up to the walls, and excessive infantile mortality. On the north and west sides the country slopes up gently to a slightly elevated plateau. On this the civil station is laid out, and along it runs the alignment of a new canal expected to relieve the water-logged soil. The sulphate-of-soda efflorescence termed reh greatly frets the farmers, still there are charming groves, green pastures, and rose gardens; and troops on the march can vary dietary with spotted deer, doves, hares, and pigs. The camping ground is a smooth and shaded lawn, near a large well approached by steps and bricked round to enclose the trunk of an ancient and objectionable peepul tree. Beware of thieves. In the last few years some people have expressed a belief in Kurnal being garrisoned again. An inconvenient distance from the rail, about seventy-four miles from Delhi and forty-six from Umballa.

LOODIANA.—On the line of rail 66 miles from Umballa, and about 112 from Kurnal. Here in May, 1846, the new barracks of kutcha brick masonry were blown down during a thunderstorm, when fifty-four men, sixteen women, and twenty children were crushed to death. The survivors of the gallant 50th had just returned after taking a very distinguished part in the Sutlej campaign, and a series of balls and suppers were being conducted. Each barrack 300 feet long and thirty-two wide, with thatched roof, the beams of pine or sal, the height twelve feet, and the thickness of the wall one brick. About four in the afternoon commenced a dust

storm, preceded by puffs of hot winds and calms. Suddenly all was darkness, and in one second the hurricane levelled the ten barracks to the ground after the fashion of a castle of cards. Darkness, rain, vivid lightning, and squalls of wind, impeded attempts to rescue those beneath the ruins of bricks, beams, pillars, sand drift and dust. The site is now a ploughed field, and in the humble cemetery, but faintly legible, are the names and numbers on the tombstones of those who perished. The town stands on the ancient left bank of the Sutlej, near the point where crossed by Grand Trunk Road and Railway. The main stream of the river now runs at a distance of five miles, but a small offshoot flows along the old channel under the town. Population 40,000. In certain directions extensive patches of malaria-producing jungle grass and low swampy ground, where a small stream stagnates, may explain sickness. Loodiana, formerly so healthy, ceased to be a station for European troops in 1851; has been described as a sandy and barren, though moist plain, liable to frequent inundations, with here and there tracts of fertile alluvial soil. The great mass of the high ground composed of a firm, light-coloured clay mixed with coarse sand. One year, while the residents of the old cantonment and city were suffering, a body of sappers located in the New Lines remained healthy. In 1851, when the whole district was temporarily a marsh, the prostrating fever fastened on Europeans and natives with equal intensity.

In 1869, to a detachment of the 13th native infantry stationed in the fort at Loodiana, the climate did more harm than three years of Peshawur,

what with fevers, enlarged spleens, dyspepsia, dysentery, scurvy, and a mild variety of oriental sore, attributed to sulphate of soda in the water. Elevation above sea level about 900 feet. Rainfall 26 inches in 1873, 17 in 1874, 36 in 1875, 14 in 1876, 37 in 1877. Climate considered dry, with excessive heat from April to October. The best periods for Europeans are between these months reversed. The mean temperature of 1877 was 54° in February, 76° in April, 92° from June to August, 75° October, 56° in December. Besides judicial, revenue, and canal officers, the community includes American missionaries. In the city, red and white chuddurs (35 to 100 rupees), socks, rugs, servants' clothing (25), are well worth purchasing from Asdoolah, Haviz Oolah, or other manufacturers, who are glad to demonstrate the various interesting phases of shawl making carried on in the humble weavers' homes. The masonry drain of the town serving as a sewage receptacle, as well as a rainwater duct, can only occasionally be flushed. According to regulations, refuse ought to be carted dry. Boundary pillars have been erected, indicating where ground pollution will be punished, and a series of stringent rules referring to the nullah under the town are enforced, but the best of poor mortal endeavour, cannot alter the flatness of the country or control the freaks and force of the mighty rivers.

LAHORE.—Those who study India merely in books, noting numerous Europeans with goodly salaries, should see climatic effects as depicted on many faces of soldiers, civilians, engineers, medical, educational, canal, police, telegraph, forest, or railway officials, in fact, of breadwinners generally, and their families,

at Lahore from April to November. Not a few, either on duty, else on leave, fortunately contrive to be at Simla, Murree, Dalhousie, or Dharmasala during the sickly months, whilst others, unlucky, impecunious, or chained to their work, must remain to battle with health-deteriorating influences. The city, with its population exceeding 92,000, too near the civil lines, will be found graphically described by Dr Bellew, the Sanitary Commissioner, and by his predecessor, Dr De Rinzi, in their various reports. About a mile and a quarter long, a mile broad, and three in circumference, enclosing a densely-packed crowd of 133 persons to an acre, this city is surrounded by a brick wall fifteen feet high, pierced with thirteen gateways, except on its northern side, occupied by the citadel and imperial mosque. A well-metalled, circular road runs round the city, and between it and the walls, except in front of the fort and mosque, is a belt of ornamental garden, divided into sections by cross roads. These gardens, laid out in flower beds and fruit plantations, traversed by carriage-roads, side walks, and a canal cut, conceal the great outfall sewer. In front of the fort the low turf ground may be inundated by floods. About 1806 wells and 533 outside the walls, according to Bellew, in 1877.

This ancient city, founded between the first and seventh centuries of the Christian era, was besieged by Timur in the reign of Richard the Second, and taken by Baber about the time when Wolsey was prime favourite with Henry the Eighth. Here also lived the immortal Akbar at the period of the Spanish Armada, and one of the chief ornaments at Lahore is the tomb erected by the beautiful and

talented Nurjehan over her drunken husband, the Emperor Jehangeer. In the days of the Moguls the city was most prosperous. The Ravee river formerly flowed so close to the walls that in 1662 it was necessary to build protecting embankments, but to-day Lahore is situated on a slightly rising ground, about a mile from the left bank of the river. Sea elevation 1000 feet. Soil, a kind of clay mixed with vegetable mould, over kunkur from ten to twelve feet, and below this a bed of sand, in which water is found. The depth of the subsoil water-level in the wells about twenty-nine feet, with from four to ten of water. Rainfall about eighteen inches, one in June, six in July, three in August. About nineteen inches in 1873, fifteen in 1874, thirty-three in 1875, twenty-one in 1876, sixteen in 1877. In August, 1878, more than eight inches collected. Placed on the same isothermal line as the Desert of Sahara, the northern part of the Red Sea and Persian Gulf, the station of Lahore is not so remarkable as Mooltan as regards excessive range of temperature and extremely dry air. Whilst the mean daily range in England only varies from 8° to 15° , at Lahore it is 31.91° , and in May and November 38° . The smallest monthly range would be 42° in March, and the highest 58° in April. The mean humidity, 44° , contrasts with 81° at Greenwich.

The cold weather may be crisp, bracing, exhilarating, and snow has fallen in January. The hot winds of May and June cannot be mitigated in their fury often by watered tatties, when thermantidotes are urgently needed. In the excellent 'Guide' compiled by Thornton and Kepling it appears that the temperature of a closed house without cooling

appliances may average from 90° to 98°, and the temperature of the outer air at 10 o'clock at night in June has exceeded 105°. The mean temperature, according to Blanford, would be—January 53°, February 59°, March 69°, April 81°, May 88°, June 93°, July 88°, August 87°, September 83°, October 76°, November 64°, December 55°. Mean for year 75°. In 1878, on the 20th of June, the shade temperature was—109° at 10 a.m., 118° at 4 p.m., 91° at 10 p.m.; maximum in shade 119°, maximum in sun's rays 171°, minimum in shade 78°. In July the rains afford slight relief, but as they cease in September the temperature again rises, and the sun acts on the wet, filthy old soil, on the crowded city, with its neglected drains, and on the civil station, the burial-ground of generations. No wonder Lahore remains comparatively healthy during a summer of drought. October and November are the months for malarious fevers, which even fasten on European women and children invigorated by the hills. Variola has been severe in November. Enteric fever runs from February to June, perhaps onwards. Chest affections and dysentery are influenced by hot days and cold nights in October. Diarrhoea in August. Cholera in August and September. Intermittent fever in October, when liver diseases are rife. Rheumatism in January.

Out of the very small European detachment in the fort not a few suffered with oriental sores until the water supply was changed. During the cholera period of 1872 the detachment drank from the Ravee, and in camp from the canal. The latter disease noted in 1846, 1848, 1849, 1851, 1852, 1856 (severely affecting prisoners), 1861, severely affecting

European troops, who also were stricken in 1862 and 1867. The camping and flight arrangements, what with telegraphic communication, elephants, camels, railways, tents, and previously selected places of safety, are now admirably established, thanks to Cunningham and Bryden's laborious endeavours to grasp the difficulties. Norman Chevers, one of the greatest of medical writers in India, relates that on first occupation of Lahore, in 1846, European and native troops were partly lodged in the city and partly encamped in open spots in the environs. Ultimately Anarkali, close to the city and bazaar, was selected, only to be abandoned as unhealthy. In April, 1849, enteric fever, with cerebral complications, originated in the small barracks crowded with European Bengal Fusiliers. In June the fever became more distinctly typhoid when not replaced by gangrenous dysentery. In July the fever fatally selected unseasoned recruits, and cases of heat apoplexy became frequent at a time when the Ravee was inundating the country.

During September fever and dysentery increased as the ground dried up, and in October matters grew worse and worse as scorbutic dysentery became developed. The thermometer registered 113° in the crowded hospital tents, and instead of the green, shaded, Shalimar gardens, a place at Shadra, on the opposite bank of the Ravee, was selected. At first great improvement followed, but the hot days and cold nights increased the sick list; and in November Dr. Bruce endeavoured to shelter the men in comfortable barracks, instead of unsatisfactory damp tents exposed to chills which encouraged fever relapses, and to rain showers conducive to dysentery.

In the end the regiment was quartered at Mean Meer, and afterwards at Meerut. Dr Bruce wanted to occupy barracks at Ferozepore and Jullundur, as the men there stationed could much better stand vicissitudes of climate under canvas than his own sickly regiment. As usual, history repeats itself. The transient fictitious improvement of fever-stricken men in camp at Christmas, perhaps on unsuitable ground, with insufficient clothing and bedding, has been noticed recently as resulting in more invaliding of sufferers with rheumatic, hepatic, and chest diseases. Anarkali lies in a hollow fifteen feet lower than the general flat of the country, and about six feet above the level of the river, therefore very difficult to drain. Sir Charles Napier, instead of Shalamar, under a wrong impression of altitude, and under the idea that fever would not flourish on the arid sand, hastily chose Mean Meer as a cantonment, five miles south-east of Lahore, and an old burial ground of the Seikh army.

The water at Lahore is derived from the River Ravee, the Baree Doat Canal, else from wells. That of the river, according to Dr Burton Brown, contained twelve grains of solids per gallon, of which eleven were composed of salts, consisting chiefly of chlorides of sodium and potassium, with the sulphates of soda and lime, and the carbonates of lime and magnesia, about .89 grain of organic matter. It holds in suspension a sediment of silicate of lime and alumina, also carbonate of lime and sesquioxide of iron. The canal, which originally diverts from the Ravee at Madhopur, 100 miles from Lahore, is more free from saline admixture, as it passes over a solid bed without much land-drainage contamination, still

the stream is liable to the usual native pollution, and the supply stops periodically. A very pretty spot is Madhopur, and to the best of recollection the canal water, fresh from the snows and scarring the lime-stone rocks and boulders, has been blamed as a cause of goitre. The efflorescence termed *rch*, near Lahore, only too prevalent. The well-water is the most extensively used for drinking and irrigation purposes. According to Burton Brown the average depth of wells would be from 45 to 50 feet in dry weather, containing 2 feet of water to 25 in the rainy season : the peculiar characteristic being the presence of a large quantity of carbonate of soda, besides chloride of sodium, sulphate of soda, carbonates of lime, magnesia, and silica, besides, too frequently, organic matter. Having attracted due attention, the water supply is eventually to be improved *when* the thirteen lakhs of rupees are forthcoming. Of the 2339 wells, inside or outside the city, very many in 1877 contained brackish, else hard, ill-flavoured water of inferior quality.

The civil station, covering an area of fourteen square miles, is traversed by sixty miles of public roads running through the suddur bazar with its population of 3500 ; through the European quarter, where 1690 people are scattered about 270 bungalows ; through the Lawrence Gardens of 112 acres ; past the suburban gardens of Shalamar, and past other gardens, shops, railway barracks, workshops, museum, hospitals, colleges, schools, the fort, and Ranjits Singh's Mausoleum. The road to Mean Meer commences pleasantly enough past substantial bungalows, pretty compounds, the Lawrence Hall Gardens opposite Government House, and a few groves watered

by the canal, but after that the prickly babul and the melancholy shabby faras or oriental tamarisk alone relieve the broad, flat, dusty plain. Near Mean Meer the white ants and kunkur, the hot winds, and dust storms, conspire against the poor trees, and the brackish water kills the roses away from canal cuts. In the Lawrence Hall Gardens are 80,000 trees and shrubs of 600 different species, including the welcome *Pinus longifolia*, the uncertain *Eucalyptus globulus*, and the carob tree of Syria.

In 1860 the place was a wilderness. Besides a botanical garden there is a menagerie and a green pleasure ground, suitable for badminton, archery, or cricket. About three miles from Mean Meer are the stately Shalamar Gardens, of eighty acres, dating from 1637, and arranged in terraces of red roses and pomegranates, of mango and sweetly scented golden orange groves, very delightful even now, especially on festive occasions, when the marble fountains, cascades, and pavilions are made to recal the oriental glories of the past. Cholera encampments, here formed for married families in 1867 and 1872, did not answer. English flowers and vegetables (especially cabbages and cauliflowers), the ordinary cereals, pulses, and millets, such as wheat, barley, Indian corn and grain, are cultivated, in certain directions perhaps too extensively when fever causes are considered. At one time complaints appeared in newspapers about impure sand in filters, and the want of compulsory legislation to enforce the dry-earth system of conservancy. Not a few Europeans and Eurasians in poor circumstances, and the sad class of destitute vagrants, are to be mentioned as dangerous people in sickly seasons. The whole of

the drainage of the city is carried through the streets in open surface gutters, there being no underground sewers anywhere, and the wells are convenient for flushing if the sweepers and water-men could be constantly supervised. Dr Bellew alludes to brick kilns, slaughter-yards for beef, goat, and sheep, the vagrant rest-house, the tanyard, and distillery, as extremely unsatisfactory when compared with the jail and lunatic asylum.

In the Mayo Hospital, the Medical College Library, the book club at Anarkali, will be found ample fields of professional research; and in the Central Museum many a leisure hour can profitably be spent inspecting specimens of the antiquities, arts, manufactures, raw products, vegetable, animal, and mineral resources of the district, as described by Thornton and Kipling. General Cunningham is the great archæologist, and Baden Powell has produced a wonderful and most interesting book on 'Punjab Products.' There is a club at Anarkali, and, besides a dak bungalow, there are several hotels at Lahore. Oscillating between hills and plains the European tradesmen, what with travelling and personal expenses, the chances of bad debts, else of climate damage to goods, are compelled to ask high prices. As regards amusements the good people at Lahore mostly look to Mean Meer for balls and parties when wearied of the rink, the police band, or of dining with each other. At the Lawrence Hall concerts, theatricals, miscellaneous entertainments, spasmodically take place. The fancy ball in March, 1878, will long be remembered as a singularly triumphant success. Besides the proposition of taking water from wells situated in the clean alluvial soil on the north side of

the fort, and pumping this filtered Ravi river water into elevated reservoirs for iron-pipe distribution, there are also elaborate schemes for improving sewerage. When these costly works are completed great improvement of general health doubtless will follow.

Distant 1294 miles from Calcutta, 713 from Allahabad, 1558 from Bombay, and 214 from Mooltan, whence the Indus Valley Railway conveys passengers homewards via Kurrachee, this important station of Lahore is also conveniently situated as regards several hill stations, especially Murree and Dalhousie. The civilian society includes a Lieutenant Governor and a large proportion of talented and fortunate men. Of the greatly beloved and thoroughly appreciated civil surgeon from 1853 to 1871 it was officially recorded "that ability, zeal, honesty, and faithfulness characterised the career of Dr Manners Smith, which from dawn to sunset was one unbroken success." According to report neither he nor his family suffered very much, although seldom at the hills, and other instances could be given of fair health for a long while being enjoyed by people who lived all the year round at Lahore. According to the 'Mayo Hospital Reports,' which include Europeans, Eurasians, Mahomedans, Hindoos, and Seikhs, acute rheumatism, chorea, and cardiac affections are uncommon. Pneumonia is often fatal and cancrum oris very troublesome. Arsenic, opium, and datura are the poisons principally patronized.

LUCKNOW.—In this city of palaces, mosques, mausoleums, pagodas, and gateways, too many buildings are poor tawdry arrangements in yellow ochre, or else a jumble of theatrical fantastic designs

in Franco-Indian architecture. The well-wooded parks and charming flower gardens are the real attractions. The Great Imambarra (300 feet long, 160 broad, and 63 high); the historical associations connected with the Residency, the Martiniere, the Alum Bagh, the Dilkoosha, the Secundra Bagh, the fort of Muchee Bhawun, the graves of Lawrence, Havelock, and Hodson, likewise the relics of the Kings of Oude, are all noted in the 'Guide Book,' or else described by wanderers and those who have written about the mutiny. At my visit in December, 1875, exceedingly beautiful were the purple bugainvillea creepers entwining the ruined walls of the Residency, and the gay scarlet poinsettias encircling the Cross on the green memorial mound. With renewed interest each traveller will again read the golden, glowing, imperishable annals of courage, fortitude, and bravery here displayed by those who suffered, fought, and died in the stifling hot weather of 1857. The mutiny broke out May 30th; on the 2nd of July Sir Henry Lawrence was mortally wounded; and up to September 25th may be reckoned the period of the siege. The original strength of the garrison consisted of 927 Europeans and 765 natives, which was reduced by casualties to 577 Europeans and 402 natives, about 230 of the latter having deserted. Sir Henry Havelock died of dysentery in the Dilkoosha, November 24th. The final capture and occupation of the city did not take place until March 19th, 1858.

Elevated 400 feet above sea level, and 100 miles distant from any hills, Lucknow, the capital of Oude, is placed on the right bank of the sinuous Goomtee river, to the north-east of Cawnpore forty-two miles

distant. Distant in miles also from Bareilly 145, Fyzabad 80, Benares 200, Sitapur 55, Allahabad 151, Calcutta 781. The district, embracing 1392 square miles, contains 790,000, and the city about 278,000 inhabitants. Close to the city is the Muchee Bhawun Fort, occupied by a battery of artillery; three miles off, on somewhat higher ground, is the cantonment, including two batteries of artillery, a cavalry regiment, two infantry regiments, besides a regiment of Bengal cavalry, and sometimes two native regiments. A large European and Eurasian community.

The modern city only established about a century, and up to 1856 Lucknow was only occupied by native troops. Old cantonments were on the opposite side of the river. Present cantonments occupy the south-eastern quarter, extending three miles from Nussir-u-deen Hyders Canal. Soil varies on right bank of river from sand to clay; on the left bank the lower ground is liable to inundation. The Goomtee and the Gogra rivers are distinguished by their sandy argillaceous soils. The Goomtee crossed by five bridges may from a width of fifty yards, spread out extensively during the rains. The good natural drainage of the city finds its way to the river during the rains by four nullahs, and into the canal further drainage can be directed. Water is found about thirty-five feet from the surface, and in certain wells it is brackish. Many wells in Oude are impregnated with organic matter, and the usual conservancy or general sanitary difficulties are aggravated by the extreme poverty of municipalities. The practice of throwing ashes and rubbish into pits near houses has caused a deposit of salt and nitre in

the soil in sufficient quantity to be commercially utilised, and at the same time to give well water a saline taste. Tanneries, slaughter houses, distilleries, old excavations, are noted in sanitary reports. Amongst products may be mentioned rice, cotton, opium, hemp, also fruits, vegetables, and timber. Mr Grant Duff, greatly pleased with Wingfield Park, particularly noticed the bael tree, the fragrant sandal wood, the *Bauhinia purpurea* with its superb flowers and scimitar-like pods, the sal, *Asclepias gigantea*, and the *Cæsalpinia sappan*, the red wood of commerce. Delicate plants are sheltered from summer heat and winter frost in houses of split bamboo, and hopeful experiments are being conducted with the date palm from the Persian Gulf and with the Cintra orange. In the shops, the trade in bangles, native jewellery, enamels, toys, and clay figures is extensive. The fairs, festivals and congresses, so objectionable to sanitarians, take place in February, March (holee), April (mohurrum), June, also in August, September, and at any period of eclipses, when the natives mass together on the river banks. The climate of Oude is considered superior to that to the south of the Ganges, though not so dry. Dry weather means health, but dry weather means also high prices of good food, scarcity, recourse to bad food, also inferior clothing, all culminating in sickness. The cold weather, commencing in October to end in March, may be associated with frost, heavy dew, and occasional showers. In January, 1874, when the night temperature was 5° below freezing point, many plantains, pine apples, casuarinas, poinsettias, colvilleas, bugainvilleas, beside mango and sugar canes, were all injured up

to seven feet from the ground. Above that height Dr Bonavia found that not a leaf was damaged by the frost. The mango trees specially noticed. The same observer in a paper on moonstroke endeavours to prove that neuralgia, paralysis, or similar injury caused by sleeping in the open on a clear summer night, should be attributed to chill, the moon only a remote cause acting by dissipating the clouds and haze, and leaving a perfectly clear sky for the play of radiation into space.

In April, 1876, after lightning and thunder in the north-west, a hail storm occurred, when, varying in size from that of peas and marbles to that of oranges two inches in diameter, the hail stones were enormous, one weighing four ounces. Hot weather commences in April; the hot winds, varied by violent dust storms, blow fiercely in May and June, when the tatties as a rule act splendidly. About the end of June, heralded by thunder and lightning, the rains tardily begin, then heavily in July and August, with occasional breaks continue. Annual rainfall about forty-three inches: about four in June, fourteen July, ten August, nine September, one October. The cloud proportion is 37 per cent. as compared with 17 at Dera Ismail Khan. Mean temperature January 59°, February 66°, March 76°, April 86°, May 92°, June 91°, July 86° August 85°, September 83°, October 78°, November 68°, December 61°. According to some authorities Lucknow is not a good station for women and children, or persons prone to hepatitis. The 85th Regiment preferred Meerut, and the 73rd carried their enteric old "man of the sea" from Subathoo, Cawnpore, and Ceylon to another favorable fever soil at Lucknow, where also

they contracted cholera, which appears almost endemic. Cholera, as a rule, commences in the European infantry lines, and though attributed to pilgrims and punkah coolies, it would appear to depend more on season than contagion. Specially noted in 1858, 1859, 1863, 1865, 1869, 1871, 1872, in fact, the disease may be an annual visitor, running on through April, May, June, July, August, particularly after heavy rains, or when the river overflows, or if the rains be deferred else interrupted by dust storms with marked electric tension. The epidemic has subsided coincidentally with complete establishment of south-west monsoon. Surgeon-General Innes records that after a dust storm, when the air was so offensive that doors and windows were closed to exclude stench, this mysterious cholera spontaneously burst out within three hours. Ample space, good management, excellent conservancy, besides sufficient vegetable dietary, would somewhat account for jail immunity at times. Diarrhoea most prominent in August, remittent fever and apoplexy in June, intermittent fever, dysentery, and hepatitis in September, phthisis in June and October, rheumatism in March and October, respiratory diseases in January, and eye diseases in April. Variola running on from January to May to cease after June. Conjunctivitis has been associated with defective drainage, and fevers are endemic. Foot and mouth disease has appeared during the rains. Dengue, an extremely painful and in some constitutions a permanent disease, termed rheumatic scarlatina, may periodically be noted as severely racking the joints. Middle-aged persons, who show no rash resembling measles or scarlatina, are punished the most.

What with beautiful parks, capital roads, good shops,

and such a large civil and military population, the station is extremely popular. Plenty of society, every description of amusement, including boating, and plenty of sport in the district. At the Chuttur Munzil, a quaint palace surmounted by gilt domes resembling umbrellas, is a most magnificent ball-room with a perfect floor, and accessible to ladies is a comfortable library abundantly stocked with books, newspapers, and periodicals. Very few places, indeed, offer so many resources as Lucknow, which need not be particularly expensive to the thrifty or others anxious to live extremely quietly. The city is somewhat remarkable for narrow lanes between high houses, and, although the surface may be scrupulously cleansed, the air often is close and foul. About 145 miles from Lucknow by rail to Bareilly, on 75 by horse dak to Ranibagh at the foot of the hills, and 10 miles more up by pony or dhooley to Nyna Tal, not by any means the least attractive of sociable sanitaria. Latterly, Oude has been added to the North-western Provinces, described as the land of the Upper Ganges Valley and its tributaries, a vast land of sweet waters, and soft, smooth soil of exquisite fertility. The home of cholera, in the amalgamated provinces, appears to be at Benares and Fyzabad. Out of a gross income of twenty lakhs, the municipalities of the North-western Provinces annually spend three and a half in conservancy, and over seven and a half on works of public utility, and this over and above charges for dispensaries, vaccination, and lighting and watering the streets.

MEEBUT.—Sunday evening, May 10th, 1857, will always be sadly remembered in the dark annals of

India as the time when the mutiny burst out at Meerut ; when returning from church along the mall about sunset Europeans were shot or sabred by sepoys. Moonlight, a little later, was obscured by the lurid blaze of burning bungalows, from whence fled helpless women and children only to meet further cruelty. After releasing comrades from the jail the mutineers fled the thirty miles across the Hindun, across the Jumna to Delhi, and compelled the fatuous old king to raise the bloody standard of rebellion. Meerut, formerly the Woolwich of India, was the most hospitable, the most popular, the gayest of the gay stations. Nor has the glory departed, what with four batteries of artillery, a cavalry regiment, an infantry regiment, one of Bengal cavalry, another of native infantry, besides a fair gathering of sociable civilians ; what with the Wheler club, the swimming bath, the racquet court, polo, pig-sticking, general sport, balls, badminton parties, the races, and the very convenient railway. Easy is it to dine at the club on the mall in the evening and to breakfast up at Mussooree, or else to lunch at Simla without fatigue. Nor is it difficult, tedious, or very expensive to reach Nyna Tal, Dalhousie, Dharmasala, or Murree, when heat or malarial fevers too imperatively necessitate flight. Rain floods, meteorological or seasonal influences, canal irrigation, railway embankments, or other causes reiterated, disputed, again reiterated, may explain the rise of water from seventeen to seven feet in the wells ; or else the long-occupied soil becomes a foul sponge exhaling pestilent vapours at the pleasure of the sun. Sea elevation 739 feet, the surface inclination a foot and a half per mile. Placed between the Ganges and

Jumna rivers, the country very flat, with slight declination to the south, insufficient to lead heavy rains into the malarious nullahs on to the Ganges, twenty-eight miles distant. The cantonment, two miles from the town, is divided by a small branch of the Kalee Nuddee, separating European soldiers and most civilians from native troops, bazars, and city. This bridged stream, the Abu Nala, receiving natural drainage of city and cantonment, has been improved from a point five miles above Meerut down to the junction with the Kalee Nuddee, six miles below. The Kalee Nuddee itself has been deepened, cleared, and straightened twenty-five miles, to drain dirty ponds, stagnant waters, and swampy lands, at a great expense, to which the municipality contributed 59,000 rupees. It was a grand work, most interesting to watch, and most promising at first, especially the earth cuts past the artillery lines, where it was my fate to battle with fever cases, and also to share the sufferings of those stricken. Although the Abu Nala is remodelled, the bottom is covered with rank grass concealing and collecting decomposing animal and vegetable matters. In the new drains near the jail the fall, unavoidably, is so slight that fluids are apt to stagnate when not slowly evaporating in the muddy ditches. The soil, mostly porous, consists of sand, gravel, clay, and kunkur. Rheumatic ailments periodically prevail wherever clay abounds, and the joint pains of dengue in 1872 were equally severe with those complicating enteric in later years. The Ganges and Jumna run in khadirs, or troughs, of widths ranging from one to twelve miles; the whole extent and breadth a basin of sand, with here and there beds of fruitful soil deposited on the surface,

so that large tracts are studded with flourishing villages on richly cultivated land. The Jumna throughout its course is marked by extensive beds of clay charged with calcareous nodules called kunkur, totally different from recent river sediment consisting of fine siliceous matter. The Ganges is distinguished by fine sandy deposit glistening with mica. Without surface soil Bengal would be a swamp, and without the clay a desert in the words of M'Clelland. The reh incrustation so fatal to land fertility consists of carbonate and sulphate of soda with chloride of sodium, some day possibly, to be converted into a blessing instead of a curse on the fields near canals.

The distances of level of subsoil water from surface of ground have been contrasted by Dr Moir with annual rainfalls in round numbers. Thus, twelve feet the water level, thirty-seven inches the rainfall in 1870; eleven and thirty-three in 1871; ten and thirty-two in 1872; eleven and twenty-nine in 1873; nine and thirty-seven in 1874; eight and thirty-four in 1875. The water stands at the lowest point usually towards the end of June. Pointing out that fevers prevailed long before the cutting of canals, Dr Moir notes that in May, June, July, when the irrigation department is pouring out its water in greatest abundance, the subsoil supply is steadily falling. Less rain fell in 1871 than in 1870, yet the spring level rose. So with 1874, 1875, and with this increase in 1875 there was a marked diminution of fever. Famines have been averted, and the general prosperity of the district has marvellously increased since the mighty Ganges and Jumna rivers have been made to feed these fertilising canals. In

1877, a dry year, when the spring level of the jail site was lowered two feet, the health of prisoners continued good. The main drainage cut of the central prison has been deepened, but unless the outfall can be still further lowered, the general health must very seriously be influenced by rainfall. About the middle of July an enormous expanse of water, a vast lake formerly, would alter the aspect of the country about the artillery lines, bazar, and the jail for a while. The rains commence about the middle of June; about twenty-six inches for the year, sometimes thirty-eight, thus roughly divided, namely, an inch in January, February, and March, half in April, one in May, four in June, eight in July, five in August, two in September, none in October or November, and variable showers, as a rule very trifling, in December. August and September, of course, are sickly months. October is a treacherous time, when hot days, succeeded by cold nights, tell on the imprudent, else on the middle-aged liable to hepatitis, dysentery, or pulmonary complaints. November and December will be exceedingly pleasant, and on to the end of February enjoyable in the extreme for those able to ride, drive, walk, dance, shoot, else play racquets, lawn tennis, and badminton. Northwest and westerly winds prevail, and about Christmas, thunder, lightning, rain, and hail may interfere with camp life or tent preparations for regimental balls. In January, with hands chapped, and shivering over a charcoal fire, it was no easy matter to write cases in the hospital, although the thermometer stood at 50° ; about 27° may be registered on the grass, and the bath water filmed with ice. Early in March people commence talking about

Mussooree, Landour, Simla, or the chances of cholera. The battered, weather-beaten thermantidote is patched and painted, the fragrant kus kus tatties turn up with the horrid old punkahs requiring new fringes, and ice bills increase. Soon the cooling appliances are in full swing, every crevice is closed during the hours of excessive heat, and within each darkened house until October (excepting when the doors are flung open during the rains) will continue the battle with climate. Certain classes of the community must face the fiery, blazing, blasting, scorching sun, and of all professions that of medicine entails special exposure at any hour when duty calls. It is very curious, when riding, or buggy driving down the mall to hospital, to notice every place shut up; not a creature to be seen, excepting the punkah puller in each verandah; even the crows, the cattle, and the pariah dogs are out of sight. Tatties work very well when the wind blows from the right direction. It suits some people to sleep out in the garden unless specially liable to ear-ache, neuralgia, colic, or any phase of chill. In April, May, and June, the hot winds, commencing at 9, 10, or 11 o'clock, subside at sunset. Dust storms, though violent, are not so severe as at Agra, Mean Meer, or Mooltan. About 114° in shade and 170° in sun's rays have thermometrically been registered. Means of maximum and minimum shade temperature would run—January 71° — 44° , February 78° — 49° , March 88° — 55° , April 98° — 64° , May 106° — 73° , June 102° — 79° , July 98° — 76° , August 93° — 75° , September 92° — 72° , October 93° — 60° , November 85° — 48° , December 74° — 42° . Means of humidity—January 52° , February 46° , March 38° , April 29° , May 37° ,

June 49°, July 70°, August 71°, September 66°, October 46°, November 42°, December 51°.

In 1876 the water level from January to March stood at eight feet, compared with nine in April, ten May and June, eleven July, ten August and September, eleven on to December. At the jail formerly the subsoil was saturated, and the level of wells in the rains rose to two feet contrasted with five in January. This jail, during eighteen years dating from 1859, underwent three phases, first of fatal contagious fever, next of cholera and contagious famine fever in 1861, then seven years of comparative health, followed in 1869 by fever and dysentery; the mortality in 1861 something appalling. Tertian and quartan ague would often be complicated with terrible nervous depression, and the gaunt spectres of prisoners longed for the sleep of death. Diminution of numbers, improved clothing and dietary, camping out, in fact, every expedient tried proved of no permanent value until drainage schemes were started, and there is every reason to believe that the sad history of the past will never more be repeated. Cholera also, unfortunately, has its dark annals. European troops suffered in 1827, 1828, 1829, 1831, 1832, 1833, every year a few cases, but severe in 1845, then almost a lull until 1856, but in 1861, 1867, 1872, the outbreaks were frightful, and the type extremely fatal. In 1867, between August 15th and September 25th, died 1 officer, 105 men, 12 women, 20 children. The disease evidently was imported from Hurdwar by pilgrims. Both the native troops and the jail escaped. The encampments on the Bijnour road were changed twice to seek tree shelter from excessive heat. The artillery

suffered mildly, indeed, one battery did not leave cantonments at all, neither did the sick in hospital nor the women and children. Three batteries encamped on the Allyghur road. The 19th Hussars, very lightly affected, did not go out of camp. For the Buffs, who appeared specially susceptible, every variety of sanitary measures or expedients in camp or barrack failed to diminish the mortality or mitigate the malignant virulence, which like a fire burnt itself out. In 1872 the non-military population of the cantonment amounted to 35,194, and in the city, two miles distant, 51,000. The district, containing an area of 2361 square miles, had a population of 1,271,454. Cholera specially fastened on the 105th Regiment, with a mortality of 1 officer, 24 men, 3 women, 7 children. Two batteries of artillery lost each seven men. In the rocket lines the two last barracks no case. In these very same barracks, in 1873, malarial fevers prostrated the young, unseasoned new arrivals. Simultaneously with cholera, in 1872, dengue, especially in August, complicated matters. What with fever and dengue, hardly a man was fit for duty, and almost every officer was sick. Cholera and malarious fever became associated. Contagion very faint indeed. There was a stagnant atmosphere; fogs prevailed; there was a marked absence of electric phenomena, and on a fine day with a west wind cholera decreased. Southwest winds prevailed. Rainfall in August and September six inches in each month. Encampments on the sand hills, by the side of the Bijnour road, two miles from barracks, on the Gurmucktesur, and five miles on the Allyghur roads, established with great difficulty, every one being sick. In the jail ten

prisoners died. Since 1872 outbreaks have proved very mild. A certain barrack near the canteen in the infantry lines (placed at wide interval between the cavalry and artillery), is pointed out as the periodical starting point in August, and it was suggested to allow more air perflation by the costly destruction of certain thatched bungalows. Excepting the cavalry hospital, near the railway station, the buildings are single storeyed. In front of the long broken line of barracks is the magnificent parade ground, below the Himalayas, 100 miles distant, and occasionally faintly visible, when the steel-blue hills and the silver glistening snows relieve the weary, dreary, dismal prospect of endless plain expanse. Behind the lines, about a mile distant, runs the celebrated mall, two miles long, dotted with scented acacias, siris, sissoo, nim, bael, babul, mulberry, the gloomy mango, and the purple-flowered kachnar trees. Each side of the kunkur metalled mall are officers' bungalows, the various messes, a chapel, the most comfortable club, and the theatre. Behind the mall, again, separated by the Abu Nala, will be the native lines, the large bazars, and the city, where all the plotting went on, whilst the Europeans on the other side of the stream knew as much as their native servants chose to tell. On the mall three bachelors, in 1873, living together, had an excellent house, with servants quarters and stabling, for 100 rupees a month. Periodically the well was cleaned out, the servants were mustered to prevent overcrowding of sisters, cousins, and aunts, and those who objected to vaccination were recommended to seek service elsewhere. In the garden grew balsams of every shade, different varieties of

roses and hibiscus, the *Bignonia venusta*, the bugainvillea, passion flowers, poinsetteas, the coral plant, the tallow tree, henna, the rose-coloured lagerstromia, the elephant creeper, wisteria, quis qualis, and the cypress vine. Violets and pansies in the cold weather. Sweetly scented were the lilies, honeysuckle, lemon plant, heliotrope, jasmine, wall flowers, verbenas, stephanotus, and myrtles. There would flourish single and double pomegranates, the jaumon plum, the delicate oleander, the graceful tamarind, also bushy russelia, with tubular bright scarlet flowers, besides sensitive plants. One variety of convolvulus with white centre, collapsed its glorious trumpets of sapphire blue for sleep at sunset; the large, white, fragrant queens of the night, the traveller's midnight lilies, revelled in the moonlight to fade away at dawn, and a number of flowers, like the marvel of Peru, changed their colours. Thanks to irrigation, the fertility of more than a million acres of district land is now ensured irrespective of capricious rainfall.

The well-water, excepting during the period from June to September, is unobjectionable, and the various chemical analyses are satisfactory. In barracks Macnamara filters used. Food supplies rather above the average, the meat fair, and what with antelope, black buck, pea-fowl, duck, hare, partridge, snipe, and district pig, the sportsman need not complain of monotonous dietary. Early in April, when white clothes are worn, the flowers are fading, the vegetables and the quality of the meat will commence to fail. During the rains, when the country is flooded, the parade ground a lake, the native lines deluged, the stables all slush, any amount of fish

resembling whitebait, will temporarily be found in over-flowing tanks and drains. A sheep fed on grain becomes eight times more costly than an English one. For 1000 men, 70 bullocks or 210 sheep monthly required. An English cow yields three gallons of milk, the Bengali four to six pounds, the quality deficient in solids and fat; the little animals fed on rice straw or husks, oil-cake, water, and green food very rarely. Sold at a penny a pint, this poor milk is chiefly adulterated with dirty water. The same fields bearing wheat at one time, yield sugar-cane, indigo, and cotton at another. The close cultivation limits the choice of camping grounds. Amongst products may be mentioned barley, maize, millet, tobacco, betel leaves, melons, radishes, carrots, turnips, garlic, plantains, ginger, turmeric, mustard, chilli, capsicum, fennel, coriander, salt, sweetmeats, horse-radish, the oils of mustard, til, and castor; mango, jaumon, tamarind, mulberry, pomegranate, bael, and excellent tomatoes. In the hospital gardens repeated endeavours failed to grow potatoes. The natives, besides rice and pulses, are occasionally partial to opium, cannabis indica and intoxicating fiery spirits. Opium in fever-stricken villages is food and medicine. The birds, including blue jays, mynars, seven sisters, green parrots, sparrows, and crows, may prove very irritating, and still more so at night are the frogs, owls, mosquitos, and musk rats. Not many snakes or scorpions. About the neighbourhood are hawks, larks, swallows, half-caste robins, humming-birds, kingfishers, herons, pelicans, egrets, storks, ibis, geese, teal, widgeon, doves, quail, grouse, and plover. In various streams, the Abu Nala, Kala Nuddie, the Ganges canal and

river will be found very fair fish, namely, mahseer up to twenty pounds weight, a description of carp or barbel, rohoo twenty pounds, sowlie fifteen, the fresh water herring a pound, also mullet, puftha, roach of the same weight, purren thirty pounds, also eels, chilwas, prawns, all varieties bad in the breeding season. Poultry and eggs very fair, and by the commissariat or else by regiments, excellent bread and cheese can be manufactured. The natives are too partial to spices and clarified butter, or ghee in everything. General expenses and servants wages are not very heavy, and disliking Mean Meer, Peshawur, most fever stations, and the cold expensive hills, all domestics dislike to leave Meerut. Children and long-haired dogs according to tradition do not thrive. During sickly months cattle suffered with listless lassitude, diarrhoea, with brown, loose earthy evacuations, aphthæ of the mouth, œdematos throat, and extreme debility running on to exhaustion. After death, red thread-worms half an inch long were found in the large intestines and stomach, yet not in the excreta.

Besides cholera, periodically noticed as starting August 15th, the other diseases may be variola from November to June, severe in April, mild or nil in July or August, and occasionally absent in cholera years. Intermittent fevers, dormant in February, are severe in September and October. Remittent fevers, low in December, mark every month, especially July. Apoplexy commences in March, high in June, subsides in October; yet no month to those who tempt fate is safe. Dysentery and diarrhoea low in February, high in August, no month free; and dysenteric pneumonia is exceedingly treacherous.

Hepatitis noticed greatly in April and November. Phthisical cases do badly from April to October, not a few collapse in August and September. Some improve from November to March. February is an excellent month when respiratory affections improve. Rheumatism in hot or cold weather is influenced by poverty, damp, insufficient clothing, or constitutional deterioration. In March, expect neuralgia, measles, eczema, erysipelas, quinsy, mild hooping-cough, influenza, boils, and prickly heat. Remember that young new arrivals, unprotected by nets in barracks, are kept miserably awake at night by blood-thirsty mosquitos, else by hungry bugs, craftily concealed by day. And these boys as regards drill, riding school, excessive fatigue, night duties, foolhardy, ignorant indiscretions in food, clothing, bathing, or solar exposure, will require extreme care, consistent with service requirements. Bright harness, every phase of smartness of men's horses or equipment, may be purchased too dearly at health expense, unless time be allowed for a process of comparative temporary acclimatization.

Excellent driving roads lead to Delhi, Umballa, Roorkee, Saharanpore, or the Ganges at Gurmuck-tesur. The railway station close to the Cavalry Hospital is about two miles from the artillery mess at the other end of the Mall. There are pleasant rides, nice walks, and woody groves about Meerut, which is 120 miles distant from Umballa, 300 from Lahore in one direction, also 395 from Allahabad, and 1245 from Bombay in the other.

MUTTRA.—A civil and military station in Northwest Provinces, thirty-six miles north-west of Agra on the Jumna and the Salt Customs Line. Rail com-

munication recently established. Just room for one regiment of British cavalry, and very well spoken of by the 3rd, the 10th, and the 11th Hussars ; so healthy that at one time the latter regiment shut up their hospital, and though cholera comes occasionally, the outbreaks are comparatively mild. As for sport, at one time the soldiers almost grew tired of shooting. "No prevailing diseases, no defects," reports Cunningham in 1877 ; and after turning over a pile of blue books telling sad tales of Mean Meer, Peshawur, and Morar, the station of Muttra is happy in its very small medical history, which is satisfactory even in the terrible years of 1867 and 1872.

In 1868, nine cases of enteric noted as imported from Mhow by the 11th Hussars, and originally thought to be traceable to the three months' voyage in a crowded transport mostly supplied with salt rations. Besides suffering with scurvy, the men were greatly fatigued in marching through the jungle from Khundwah to Mhow. Of course, like every other station on the plains, Muttra must be hot, and the climate in many respects resembles that of Agra. The city is fairly raised above the Jumna, which flows below the ghats and temples. No town in this part of the country is more revered by Hindoos, for here lived their merry god Krishna. Monkeys and sacred bulls are quite at home. Houses, occasionally double storeyed, are built of brick, else of elegantly carved grey sandstone. The Holi bazaar, with its ornamented over-hanging verandahs, and the brick built mosque of three domes and four minarets, elevated on a platform, will well repay a visit. The water supply is ample, the quality perhaps brackish. At one camping ground,

on the march from Delhi to Agra, neither palatable tea nor coffee could be made with well water. Everything about Muttra shows the wealth of the resident nobles, priests, merchants, and bankers. At Bindrabund, six miles off, one of the latter class, many years ago, made a large fortune by tapping the telegraphic wires, a sin now being expiated by the building of a magnificent shrine not to be entered by other denominations or nationalities. Most of the arrangements, however, can be seen from the summit of another building. Fergusson writes that the porch of one temple is unique, not only on account of the elegance of its outline and details, but from its having a vaulted roof not constructed of projecting stones, but of true radiating arches like our Gothic vaults. "No one (writes Fergusson) who has personally visited the objects of interest with which India abounds, can fail to be struck with the extraordinary elegance of detail and propriety of design which pervades all the architectural achievements of the Hindoos, and this not only in buildings erected in former days, but in those now in course of construction." In a wonderfully carved red sandstone cathedral, the morning service, in certain details, resembled peculiar ceremonials in London ; but the poor idols, instead of blazing with silver and gold, or sparkling with peerless diamonds, sapphires, rubies, and emeralds, as in the good old times, looked more like effigies historically associated with gunpowder treason and plot. The people were suffering greatly with ophthalmia. Certain princes hope to arrange any faults in spiritual matters by building, at great expense, fantastic mansions ornamented with most improper statues and frescoes.

To the student of architecture or mythology Muttra and Bindrabund will prove very interesting. To suppress *ennui* and nostalgia every man requires in India some pet hobby. Formerly we mixed much more with the people who said to Colonel Meadows Taylor, soldier, administrator, man of science and of letters, "Our women will sing of you as they grind corn in the morning, and will light their lamps in your name at night. Come back to us. Oh, come back." He lived forty years in their land to rule over an enormous population of most industrious and intelligent individuals. In no other country of the same extent are there so many distinct nationalities, each retaining its old faith and its old feelings, and impressing these on art. By those best qualified to form opinions, the buildings in India are unrivalled as displaying an exuberance of fancy, a lavishness of labour, and an elaboration of detail nowhere else to be found.

Very small European community at Muttra where, in September, 1879, about 20,000 natives died of fever.

MEAN MEER.—Described at length in 'Indian Medical Gazette,' vol. xii, p. 204. Nothing fresh to record, excepting that more canal cuts run through the sand towards the artillery hospital. No amount of lamplighting or corn-grinding hymns of praise would tempt people back unless feverproof.

MOOLTAN.—Described also in same journal, vol xiii, p. 141. A much nicer station than Mean Meer, but rather out of the way as regards Lahore; 214 miles, all night or day by train over arid desert, occasionally relieved by dusty melancholy tamarisks or castor-oil plants. To Mooltan my idea is to send

rich young phthisical persons from England as soon as possible, instead of temporising with nauseous drugs or well-known useless remedies. In October start from Southampton, or other port, for Kurrachee, from thence, by Indus Valley Railway, direct to Mooltan. Stop there until March, then train through Lahore to Umritzur, drive to Pathankote, dhooly up to Dalhousie: or else train from Mooltan to Saharanpore for Landour: from Mooltan to Umballa for Kasauli, Subathoo, or Simla. From Simla, which has many objections, it is easy to reach Nagkanda (9000 feet), or else to avoid rains by slow travel to Chini. Subathoo is pleasant enough in certain months, and being so much lower there would be less liability of dyspncea, palpitation, bronchial irritation, hæmoptysis, hill diarrhoea, dysentery, or any other miserable complication to confirm the hopeless opinion that expatriation too often only accelerates fate. Instead of an atmosphere saturated with moisture, the climate of Chini, during the hot and rainy seasons, is considered dry, elastic, and invigorating. The sky is generally of a clear azure colour, and when mists arise they are attracted by the lofty, snow-clad peaks, and rarely descend into the valleys. Showers are few and gentle, the air is powerfully tonic; the mean daily temperature in July, August, and September, in an unsheltered tent, ranged from 64° to 69°, when registered by Dr Grant. Whichever hill sanitarium would be selected for the patient he should there remain until November, then return to Mooltan. In the following March the physician will be able to advise as regards returning to the hills or home to England, else to try a sea voyage in a sailing ship. Dr

Walsh writes that, "in the ingenious application of meteorology everything is remembered except the patient." This, to a certain extent, is unavoidable. In the 'Indian Annals,' Dr R. T. Lyons gives an account of Mooltan, and, after alluding to the dust storms and the fiery heat, he expresses an opinion that, as cultivation increases, the station will annually become cooler. Heat intervenes between March and September, especially in July and August. Between October and February the weather is temperate and agreeable, with cold nights requiring fires. The temperature is then delightful, the clear, mellow atmosphere and an unclouded sky, all alluring persons to seek outdoor occupations. The brilliant light is then softer, more subdued. The dry air is of great tenuity, and during the hot months its avidity for moisture is insatiable. Clouds so rarely appear that the sky is generally serene; the fall of dew also so slight that people sleep out in the garden with impunity. Winds mostly blow from the south-west. Annual rainfall five inches. Mean temperature—October 76°, November 66°, December 56°, January 54°, February 58°, March 70°. The crisp air, the bracing cold, the dry atmosphere, struck me, in 1878, as likely to benefit selected phthisical cases chosen from the opulent classes with ample leisure and congenial companions at command. In 1880, after the perusal of books and papers playing on the one string of antiseptic air, my opinion remains unchanged. The sea voyage, and the difficulty of amusing the patient, unless he chose to take an interest in India, are serious stumbling blocks. As regards lodging, clothing, food, books, society, the usual recreations, all could easily be managed,

for the rich have many friends. As regards medical attendance, the most talented, the most skilful in practical knowledge, are easily to be found at all large stations. According to experienced writers, neither geographical position, nor the temperature of a region, have anything to do with consumption, which is developed everywhere. In some places patients recover, but cannot leave, and in others, phthisical emigrants multiply mischief by inter-marriage. The soldier's death-rate in India corresponds with that of Canada. More cases are invalidated from Bombay and Madras as compared with Bengal, where the enervating influences of excessive heat and of malaria more quickly hasten the end. This particular class, besides probable hereditary taint, has to contend with all the exigencies, all the vicissitudes of climatic service, the alternations of temperature, the chance of exposure, besides the temptations to ignore precautions and, living imprudently, to scoff at hygiène. The duties, food, clothing, barrack existence, and habits of the soldier would have nothing in common with the customs of the rich invalid comfortably located in the hills when Mooltan becomes too hot. Dr Theodore Williams, who, doubtless, would give more information were it procurable, mentions that of ten patients who resided in various parts of India, six were in the first stage and two in the third. One of these, who had a very large excavation in one lung, and some consolidation in the other, lived for upwards of ten years, and during the greater part of this time did active duty as colonel of a regiment in a hot place, also engaging in field sports, including tiger shooting.

In Braun's book 'On the Curative Effects of Baths and Waters,' Dugshai, Kasauli, and Simla are called elevated spas. Most physicians ask for healthy soil, pure air not too moist, without extremes of temperature or exposure to cold winds and bad weather, bright sunshine, pretty scenery, pleasant company, everything to entice the patient out of doors. Pollock points out that *warm dry air* lessens bronchial irritation; that good effects are due to *purity and dryness*; that cases of softening tubercle with febrile symptoms do badly in mild air; that relaxing climates with damp atmosphere are injurious; that a patient should never be sent abroad whilst labouring under irritative fever; that all activity of disease should have subsided, and that the digestive system be in fair order. Tonic and bracing inhalation appears the *prolonged* requirement, and the dangers of spring in England are noted by several writers, who tell *so much* about meteorological and picturesque data, also about the geographical distribution of disease, but *so very little* about the history of exiled invalids. Dr Walshe, who bitterly complains of this dearth of information, insists strongly on the fact "that there are influences of climate wholly beyond the range of meteorological investigation,"—"climates, in truth, of closely the same atmospheric character producing effects very dissimilar on the human economy." All standard authorities honestly confess that *no* climate can stamp out phthisis. The disorder, neither local nor due to lung or bronchial irritation, has been defined as a tubercular ulcer with a tubercular condition of system. Muscular exertion, high atmospheric temperature, the exciting nature of certain climates, may

provoke haemoptysis, or else an attack of ague might rekindle the smouldering fires of destructive fever. In Cyprus some men escaped endemic disease only to drift into consumption, whilst others with weakly lungs broke down when enfeebled by malaria. So with cases from Malta and Gibraltar. Phthisical soldiers who return from India to struggle on in England mostly hail from Bombay or Madras. Dr Alcock, to avoid much mortality and invaliding, suggested sending regiments from England direct to India, and afterwards to the Mediterranean before starting home.

The rainfall at Mooltan amounted to seven inches in 1873, nine in 1874, three in 1875, six in 1876, thirteen in 1877, when mud houses collapsed. In 1858 and 1863 ague, dysentery, diarrhoea, and scurvy prevailed, whilst fever relapsed after a rainfall of seventeen inches. Hygrometer, in 1876, registered 46° in January, February 43°, March 42°, April and May 24°, June 36°, July 46°, August 54°, September 46°, October and November 48°, December 46°. About 19° of humidity have been remarked. Constitutional vigour and energy characterise the inhabitants of hot and dry localities, and from rainless districts came all the conquerors of the Old World. In the dry air steel instruments, scissors, swords, may be exposed in a careless manner for years without rusting. The dreadful heat of summer does not specially tell on the careful. Great range of temperature, associated with dry air, need not be injurious. The mean daily range in 1875, a very dry, and 1877, a very wet, year, are contrasted. October 34°—23°, November 31°—21°, December 25°—19°, January 36°—24°, February 31°—27°,

March 37°—26°. Calculated for ten years, not two inches of rain would fall from October to March. Everybody knows somebody who could confirm the statement that most wonderful instances of life prolongation are occasionally encountered as traceable to climatic influences. It might be necessary for the rich young man, the subject of my text, to remain for years in India, and share the lot of the many Europeans who have to make it their home. Business in England is very easily transacted, postal and telegraphic facilities daily increase, friends could come out to see the poor consumptive lad changed into the strong and sturdy sportsman. Indeed, it would be better to stop in Bengal for a long time under circumstances indicated. And after all why not?

RAWAL PINDEE.—Changing trains at Lahore, the traveller proceeds 100 miles by another rail to Jhelum, thence, until lately, 60 miles by horse dak to Rawal Pindee, distant 60 miles from Attock, 100 from Peshawur, and 39 miles from Murree, but actually from the hills only 12. For fourteen miles from Rawal Pindee to the foot of these hills, the road is metalled, afterwards composed of stiff clay, the winding gradient easy, the outer side protected by a stone wall. The time occupied ascending from Pindee (1500 feet elevation) to Murree (ranging from 6500 to 7500) about five hours. Dr Campbell Mackinnon reported that of all the stations he knew none came up to Rawal Pindee. Situated on an elevated ridge it possesses perfect natural drainage. The slope of the country on both sides is so considerable that water must run off almost immediately. The elevation lowers the temperature, so do the cool

breezes from the neighbouring hills, and the cantonment, thoroughly ventilated, was then sparsely wooded. Latterly, arboriculture has been encouraged. The land is scarred by ravines and water courses. The crops, excepting near the hills are poor, the barley and grain in certain directions satisfactory, the general aspect of the country somewhat wild.

From hill proximity heat radiation does not increase temperature, and the dry north-west winds cool and clean the station. Many writers are in raptures with the climate for seven months. The cold weather lasts about six, and in December and January the frosts are frequently severe. The heat is only oppressive for three months ; pleasantly cool weather continues until the middle of May, when the hot winds commence to blow from the south-east. Rain water, instead of lodging or penetrating runs off into proper channels. A river flowing half a mile distant may be a stream, a torrent, or form semi-detached pools, and the various schemes for bringing drinking water, when the wells run dry, by iron pipes from distant rivers, are retarded by financial difficulties. During seasons of drought, sickness may be provoked by bad food, else by foul vapours from unflushed ravines. The geological formation consists of a base of conglomerate limestone boulders varied with veins of sandstone which cross out in several places, superlaid with pure red clay, over which is a stratum of fine loam. On certain roads there are sheshum trees. The city, two miles from the station, contains a population of 20,000. Rawal Pindie the headquarters of the Jhelum Division, accommodates two batteries, a cavalry regiment, two infantry regiments, one of Bengal cavalry, two of native infantry, besides

sappers and miners, also the usual number of civilians employed in different departments. Besides the dak bungalow there are two hotels, also a tailor, a chemist, and, of course, an auctioneer. Messrs Jehangeer and Jamasjee also figure as agents, merchants, or universal providers.

Wells ranging in depth from sixteen to forty-three feet have ran dry in hot weather, and from June to August in some localities the water might smell offensively. The quality of the river supply needs no chemical evidence to prove that it must be different in streams above or below a city. Well and river water in Dr De Rinzi's time proved to be hard and containing five grains of magnesian salts. The rainfall on ten years' calculation would be thirty-one inches, divided, two in January, one in February, two in March, one in April, May, and June, eight in July, six in August, three in September, scarcely any in October and November, just an inch in December. In 1875, a very healthy year, the rainfall exceeded forty-eight inches. Bellew shows that in 1877 the rains were extremely irregular in selection of months, the total amount of forty inches, however, in excess of average of four preceding years. The mean temperature for ten years contrasted with that of 1877 ran—January 48°—51°, February 52°—49°, March 60°—62°, April 71°—68°, May 81°—78°, June 89°—87°, July 87°—89°, August 84°—89, September 80°—84°, October 69°—70°, November 57°—61°, December 51°, in both instances. The mean of solar radiation, for instance, in 1876, is published as 92° in January, 162° in June; the mean maximum in shade, 58°—102°, the mean minimum 37° in January, to 77° in July; the mean daily range January 20°, February

23°, March 24°, April, May, June 31°, July 18°, August 16°, September 25°, October 27, November 31°, December 30°. Taking 100° as saturation, the hygrometer would register from 39° in April, May, 32° June, 76° August, 54° October, 59° December. Cloud proportions January to March 4, May, June, September, November, December, about 2, and 1 in October. An interesting table by Blanford gives the difference of temperature between Murree and Rawal Pindee as—January 9°, February 11°, March 12°, April and May 14°, June 17°, July 19°, August 17°, September 13°, October 10°, November 7°, December 6°, and for the year about 13°.

During hot dry months typhus may be endemic in the district, and in the jail either contagious typhus, relapsing or enteric fever, if not typhoid pneumonia relieved hypodermically by quinine, has occasioned controversy. In one cholera year the jail, previously well provisioned, altogether escaped. This disease really finding no welcome, as a rule, flits elsewhere, the introduction traced to pilgrims or wanderers from Cashmere or Murree. In 1872 a description of quarantine was attempted, but about 300 persons *supposed* to be fumigated had daily passes. Altogether, Rawal Pindee is conspicuous by its absence of pestilential history. Natives are said to suffer with variola, rubeola, calculus, mild rheumatism, and malarial fevers. In European hospitals, according to Bryden, cholera has been treated in August; variola mostly December and January; respiratory diseases most numerous in March; hepatitis and rheumatism in April; apoplexy, diarrhoea, phthisis in July; remittent and continued fevers, dysentery in August; intermittent fevers in October.

Increasing research only yields more and more convincing proofs that Rawal Pindee will continue one of the best stations until overcrowded in years when wells run dry or the rains are scanty. Then look out for enteric. Recently established railway communication will add still more to the local advantages.

ROORKEE.—The Himalayan view from this charming little place was thus described by Bayard Taylor : “ The faintest pink of the sea shell slept upon the steeps of snow, and their tremendous gulfs and chasms were filled with pale blue shadows, so delicately pencilled that I can only compare them to the finest painting on ivory. When I reflected that each of those gentle touches of blue was a tremendous gorge, where darkness dwells all day, that each break in the harmonious flow of the outline on the sky was a frightful precipice, thousands of feet in depth, and inaccessible to human foot, I was over-powered by the awful sublimity of the picture. But when their colour grew rosy and lambent in the sunset, I could think of nothing but the divine beauty which beamed through them, and wonder whether they resembled the mountains which we shall see in the glorified landscapes of the future world.” About 91 miles from Landour, 35 from Deyrah Doon, 23 from Hurdwar in one direction, also 70 from Meerut, and 346 from Allahabad ; the nearest railway stations are those of Deobund and Saharanpore, about sixteen and twenty-five miles of good road respectively. Encamped near Roorkee in 1873, it was my luck also to witness the religious ceremonials at the wonderful Hurdwar Fair of 1877. Every variety of sport in the vicinity, from snipe to tiger, and mahseer

fish up to eighty pounds in the Ganges. The endless list of animal life will include fox, antelope, black partridge, kingfishers, peacock, quail, grey partridge, ducks of all kind, jungle fowl, silver pheasant, stork, bittern, canvas back duck, hyenas, leopards, pig, and jackal. Standing on the Lion's Bridge at Roorkee in 1873, noticing on the right the tall chimneys of the workshops, on the left at some distance a city of white tents, the visitor looking up the Ganges canal saw a noble rapid flowing river, whose soft green banks, relieved by refreshing trees, are connected every three miles by red brick bridges. In the distance rise the fir-topped Sewaliks, sometimes dark, when not purple and gold; behind, again, are the lower ranges, sometimes sapphire, the houses at Landour occasionally visible, whilst beyond and above again the lofty peaks of snow proudly approach the azure blue sky. The station, 932 feet above sea level, is eighteen miles from the Ganges in westward direction, forty eastward from the Jumna, the canal sweeping north and west of the cantonment. The land, generally a sandy loam, is cut by rivers and hill torrents. In the cold weather wheat, barley, grain, cotton, and sugar-cane flourish; the rain crops, consisting of millets and Indian corn. For six months the temperature ranges between 55° and 75° , the rainfall about 30 inches, three-fourths in July and August. At Christmas it may be very cold. Natives suffer with fever, rheumatism, chest complaints, and, considering the proximity of Hurdwar, cholera outbreaks are comparatively mild. On the last occasion the native latrines at the Thomason College were mentioned, and at other times the strictest of police regulations are

required to prevent defilement of the ground especially near the canal. The rainfall of 25 in 1877 contrasts with 58 in 1871. The mean temperature and humidity in 1877 ran January 56°—57°, February 61°—54°, March 70°—40°, April 81°—27°, May 88°—39°, June 90°—45°, July 85°—69°, August 84°—69°, September 82°—64°, October 75°—48°, November 65°—44°, December 57°—55°. Mean of solar radiation and terrestrial radiation in June 147°; mean max. in shade, 103° in May; mean in December 43°. Winds northerly January to April; west and east May to July; south and east August to December. Hill breezes temper heat. Well water in 1860 was at forty feet from surface, apt to run dry if very far from the canal, the quality of the latter supply soft, good, and pure, and very cold. At Christmas the temperature personally registered was 55°, but this canal water appeared to the foolish bathers much colder. In March the snows melt, in July to September bridges and banks have been endangered, but from November to March the river is free from floods.

The canal, diverted from the Ganges at Hurdwar, and traversing, with its four branches, about 800 miles, rejoins the river at Cawnpore. The greatest depth about ten feet, the breadth 170, the bed slope eighteen inches per mile, the rate of flow three miles an hour. At one point it burrows under a river, at another it flows through a second river at right angles; and at the eighteenth mile the water is conducted over the Solani River by means of an aqueduct, 920 feet long, supported on fifteen arches, each fifty feet span, the piers resting on masonry sunk twenty feet in the bed of the treacherous river.

Over this aqueduct also, artillery horses, guns, and waggons passed in 1873 by the side of the canal. About two miles below the station irrigation commences. The Royal Engineers have a comfortable mess, so also the headquarters of an European regiment with a wing at Delhi. The neat bungalows are surrounded by pretty gardens, and at the Thamason College, where students are taught everything practically appertaining to roads, railways, drains, bridges, buildings, or canals, there was a capital library, a printing, a lithographic, a photographic, a chemical, department. In the museum were models, specimens of rocks, woods, cements, various fibres, and of oils, with the seeds from whence expressed, besides fossils of horses, crocodiles, tortoises, rhinoceros, of strange fish and sea shells found in the Sewaliks. Near the College are the workshops where steam engines, lathes, noisy hammers, planing machines, punching inventions, blazing furnaces, and glowing forges are busily engaged to meet the daily wants of railways or public works. Hurdwar, the temples and the island, would require many pages which will not be inflicted on the reader. Elevated 1000 feet, it is situated on the southern slope of the Sewalik Range at the mouth of the gorge through which the Ganges escapes from its cradle in the Himalayas to the plains of Hindoostan. Engineers are ever keen on the watch to prevent the river changing its course. The pretty valley, abounding in dense jungle and swamp, is intensely malarious, and at night the roaring wind recurs to recollection. In April, 1867, wearily on foot, in carts, on mules or camels, myriads flocked to the fair, said to be the last, as the canal cutting had

desecrated the Ganges. The hot weather of March had been succeeded by pleasant breezes, until one afternoon, when thunder and lightning killed two men besides severely burning four others. Down poured deluging rains that night, drenching to the skin the miserable half-starved pilgrims, who next morning resumed drinking and bathing in the dirty water. Out came the sun, and so started cholera which was carried in all directions. In modern days pilgrims are heavily taxed and sanitary arrangements most strictly enforced.

An old gentleman down country wishes that his ashes be consigned to the Ganges at Hurdwar, and some relation starts off with a small piece of parietal bone, perhaps ornamented with silver or gold, belonging to the lamented defunct. Arrived at the steps, the faithful relative unpacks the dirty rags, and, with much ceremony, throws the jewelled bone in the sacred river; only to be purloined by a diving thief when not occupied with stealing some lady bather's earrings. The priests also require one rupee here, one there, another when the dripping nymph, bewildered and perplexed, is struggling up the steps to join her venerable grandmother or chaperone, also very wet. There is no exposure of the body, as clothes are expeditiously changed in the water. Terrible deformities of man and beast are some of the attractions, and the dirty fakirs in every phase of filth or painful penance, the halt, the maimed, the blind, the sellers of fruit and sweetmeats, the gay garments in one direction, the dripping rags in another, the beating of drums, the never-ending song of joy on approaching the steps, are not soon to be forgotten. Long ago it was sug-

gested to stop cholera-producing pilgrim fairs, and annually, much to the disgust of the local clergy, the crowds are decreasing.

The area of the Doon is 1000 miles; the mean temperature by day 80°, by night 64°; the rainfall, sixty-four inches, contrasting with ninety-one at Landour, and forty-seven at Roorkee, thirty-five miles south of the Doon and beyond the Sewaliks. The Solani Aqueduct, also the tombs, palaces, temples, mosques, forts, and barracks or stations scattered over the country, have all beautifully been photographed by Shepherd and Boorne, who have a London agent in Soho Square.

SEALKOTE.—By rail from Lahore to Wuzeerabad sixty-two miles, thence twenty-seven more by dak to green, well-situated Sealkote, with its charming expanse of verdure, its glorious views of the blue high lands and snow peaks of Cashmere, even including Pir Punjal (17,000 feet), and its comparatively cool, delightful climate. The combination of wood, water, hill and dale, jungle and forest scenery will also well repay a pilgrimage to Jammu, the official capital of Cashmere, and about twenty-seven miles from cantonments; along an uncomfortable dusty road, gradually getting worse and worse, across cart ruts and ploughed fields to reach the pretty river Tow crossed by elephants. Upwards next the traveller is carried through the castle gates, past the sentries, through the dirty city of red and white stone, past the quaint palaces, to arrive at the house lent to Europeans. Siranagar, 144 miles distant, requires very special permission to approach by this route, said to be extremely troublesome. Elevated about 1200 feet, Sealkote is a

narrow parallelogram raised between two nullahs, always dry, except when rain falls, and the soil does not retain water on its surface. The country is cut by ravines and watercourses. The nearest elevation, thirty miles off, is about 1000 feet, but there are waves upon waves of mountains tempting the eye. They do not belong to us, and probably would be found unsuitable as sanitaria. The light-coloured, hard, heavy district soil will exhibit alternate layers of sand and clay, with kunkur beds ranging from six feet. This is the land where Porus fought and Alexander conquered. The rainfall amounted to thirty-seven inches in 1873, twenty-five in 1874, forty-eight in 1875, fifty in 1876, and thirty-two in 1877. In 1876 the unusual register of twenty-seven inches between July 10th and 31st caused country inundation, and with hot sunshine cholera cases increased. The city is about two miles off. Jammu, to personal knowledge, is a very dirty place, totally callous to sanitary suggestions, and when the wind blows towards Sealkote in sickly September, and Cashmere beggars, vagrants, and diseased persons appear in bazars, the usual consequences occasionally result. Yet, in reality, very rarely does the mysterious pestilence flourish to any extent amongst Europeans. On one occasion some energetic official after stopping the Ravee ferry, received a bill of 5843 rupees as compensation required by the indignant proprietors. Mean temperature—January 53°, February 55°, March 67°, April 78°, May 89°, June 95°, July 87°, August 84°, September 82°, October 76°, November 69°, December 55°. From its proximity to the hills the station is exposed to sudden gusts and variation of temperature to account

for colds, rheumatism, and neuralgia. This, indeed would appear the chief objection. On my arrival there, Sunday morning, March 17th, at the capital dak bungalow about daylight, the lavender-shaded mountains capped with snow were in full display. The troops consisted of the 9th Lancers, 72nd Highlanders, H. C., R. H. A., 1st B. C., 15th N. I., all doing their very best to keep up the character of the station as one of the most sociable, the most hospitable, and the least dull of Indian garrisons. The distance, say, from the cavalry to the infantry lines is inconvenient. There are some very nice houses with pretty gardens. At the Horticultural Show, March 30th, besides violets, verbenas, daisies, pansies, hollyhocks, roses, ice plants, and shoals of others, the strawberries, peas, and good potatoes attracted special notice. Fir trees flourish in the public gardens, which were looked after by Dr Groves Irwin with great solicitude. Drinking-water is considered good and sufficient, the quality somewhat hard, and in certain directions the presence of soda noticed by sanitarians, none of whom blame the water. Variola may run from December to July. Intermittent fevers increase from May, attain their height in August, to diminish in October. Remittent and continued fevers, severe in June, run from May to September. Apoplexy in July. Dysentery high in May and September, on to November no month clear. Diarrhoea in August and September. Hepatitis, June to September and October. Respiratory diseases, May on to August, then a perceptible diminution of admissions. Phthisis mostly doing badly in July, August, September, October, but in December either the cases have gone to rest,

or else, having improved, as invalids will remain in the country for months longer. Rheumatic admissions highest in February and March, then a rise again in July, showing the meteorological connection. Rheumatism, neuralgia, and gout would appear the most troublesome ailments. People once quartered at Sealkote would require much pecuniary pressure to induce them to exchange to Mean Meer, Mooltan, Morar, Ferozepore, Peshawur, or a number of other stations, even though on the line of rail. Officers complain of insufficient wood and sport in the district. The prolonged and somewhat complicated journey up to Murree or Dalhousie is another slight drawback.

In the valley of Cashmere cholera commencing when the snow covers the ground at Christmas, may continue all the year, and be specially virulent at Srinagar, when the rains wash the city filth into the river drinking-water. During hot and dry weather in June or July the scourge abates.

UMRITZUR.—Sacred to the Sikhs, as Benares to the Hindoos, this wealthy, bustling, densely-populated city, said to be elevated 850 feet above sea level, is placed between the Beas and the Ravee rivers, on a plain sparsely covered by mango, nim, and sirrus trees. Public and other gardens are exceptionally good in display, specially of orange groves, roses, bright flowers, and graceful shrubs. No hills nearer than the Sub Sewaliks. No rivers close to the city. The Baree Doab Canal, ten miles off, besides irrigating the country, sends a branch through the civil station two miles from the city, for tank purposes. The soil consists of sandy alluvium of variable depth, over ten feet kunkur beds,

and below, overlying a stratum of tenacious blue clay, is pure fine sand sparkling with mica. The city is surrounded by a wall, and this, again, by a pool of water; within this wall the town is divided imperfectly into three portions by the remains of three moats formerly surrounding separate fortifications. The level of the whole place is below that of the surrounding country, so the filth and refuse will collect in the moats, else in large depressed swamps called "dabs," which are simply open cesspools, wherein the city sewage is spread out to dry, or to soak into and saturate the earth. For 130,000 persons were 1000 wells close to houses and open drains. The soil around the vicinity is free from chlorides. As contrasted with a London well analysis yielding 223 parts of chlorides in every million, the proportion in Umritzur water amounted to 2700 parts. Deep borings proved that however pure the water percolated from distant sources it became seriously polluted as soon as it came in contact with any accumulation of filth. In reality this excessive contamination was confined to the immediate vicinity of the city. Yet the drinking-water is very well liked, and although cholera outbreaks have occurred oft complicated with malarious fever, as in 1856, 1867, 1869, and 1875, most marvellous and incomprehensible immunity may be enjoyed in other sickly years. Severe instances of diarrhoea and dysentery may be encountered. In Cunningham's 'Sanitary Report' for 1877 mild fevers are ascribed to large amount of watery vapour from the soil. Amongst other improvements, the drainage of the fort diverted from ditch and carried over it well in cantonments selected for filter tank. The report of the Royal

Commission does not allude to this great and important city. The celebrated lake of immortality, supplied by springs and a canal branch, is said to be a square of 150 paces. In the centre of the lake stands the basilica of marble and gold erected by pilgrim contributions in 1581, a small quadrangular building crowned with a flat dome surrounded by numerous glittering little belfries, and connected by an elegant marble causeway with the pavement. From a short distance the combined effect of the bright silver-gilt bubbles dazzling in the sunshine, of the white marble radiance contrasting with the blue water, will be very pleasing. Beyond mosaic work, and curiously carved designs, the temple did not appear deserving of a close inspection entailing trudging along the tank pier in a pair of list shoes and being persecuted to subscribe towards supporting the priests, numbering 600, some of them most venerable ecclesiastics, not a few most truculent old rascals to look at. What with shawls, silks, cloths, cotton, oil, indigo, and banking, many citizens are opulent, and here and there stand up from amidst the green of the gardens the towers of the ancient nobility. In the Fort of Govindghur, constructed by Runjeet Singh in 1809, was the Koh-i-noor treasured. The community, consisting of a detachment of artillery, of the line, and of native infantry, plus a few civilians, make up a small society. The heat is reported excessive, and the climate, in some respects, resembles that of Mean Meer. Rainfall amounted to nineteen inches in 1873, sixteen in 1874, forty-three in 1875, thirty in 1876, thirty-two in 1877. In 1875 cholera ran seventy-eight days, from July to October. After the epidemic

of 1869, when 3000 persons died, the city was improved by the filling up of huge holes, formerly receptacles for town sewage. Diseases: Cholera in August and September. Variola April to July. On the ninth day of the eruption cases are taken through the streets in procession to some temples. Both Hindoos and Mahomedans approve of this dangerous practice. Among the Cashmiris funereal feasts are celebrated in infected houses of mourning, and the teacups or vessels washed with dirty rags. Dying persons crawl to the wells, and in the ditch which receives the discharge of the town drains do washermen ply their vocation. Hindoos and Cashmiris, drinking each from their own wells, may enjoy very different health, although other conditions are exactly similar. Intermittent fevers, running on from June to December, have proved severe in October and November. Remittent and other fevers from April to October specially noticed in August and September. The fever type is pitifully exhausting, somewhat akin to that of Ferozepore and Mean Meer. Apoplexy occasioned admissions even in September. Dysentery most noted in August and September. Hepatitis from May to October. Respiratory diseases in January, April, and July. Phthisis in August. Rheumatism from May to September. About 155 miles from Umballa, 32 from Lahore, this station is fairly convenient for Simla and Murree; about sixty-seven miles to Pathankote by dak and fifty-two more miles by dhooly to Dalhousie.

UMBALLA.—Only thirty-eight miles, or four hours' comfortable drive, during sleep, to Kalka at the foot of the hill, thence, by swift tongha, fifty-six more miles up to Simla, the total journey most easily

managed leaving Umballa after dinner, resting awhile at one of the Kalka hotels, and arriving in time for luncheon at Olympus next morning. From Kalka to Kussowlee, another convenient sanitarium, the distance is only nine miles along a road suitable for ponies or dhoories, not for driving or for camels. The new Simla tongha route, however, can be utilised for a portion of the distance for the conveyance of furniture. From Durrumpore, fourteen miles from Kalka, a very fair, almost level, line of way of ten miles leads to Subathoo, which is only elevated 4300 feet, as compared to Kussowlee, 6385, Dugshai, 6100, and Simla, exceeding 7000. A very few houses are to let at Subathoo, now occupied by a portion of a line regiment, and recommended as a pleasant retreat during the rains, or else when the higher elevations are bitterly cold, with the wind whistling through the pines, about Christmas, when the mountain waves are uniformly covered with chilling snow. A little off the Simla road is the Lawrence Asylum at Sanawar, and also the military station of Dugshai, accommodating a line regiment and a few extra soldiers' families. Sir Frederick Fitzwygram, at a great expense, has here erected barracks as sanitaria for the families of cavalry soldiers. A few miles from Simla is the healthy, and gradually enlarging station of Jutogh. At Solon, also, twenty-six miles from Kalka and thirty from Simla, a number of huts, at an elevation of 5000 feet, answer admirably for health purposes when Umballa is sickly or overcrowded, and the newly-arrived lads in a regiment fresh from England are commencing to waste or look pale. The Deputy Surgeon-General stationed at Umballa is wonder-

fully fortunate in his lot, and by a judicious selection of season in inspecting Jutogh, Solon, Dugshai, Subathoo, and Kussowlee, may arrange matters very comfortably. Jullunder, 103 miles by rail from Umballa, is also in the happy Sirhind circle. Kalka is elevated 1850 feet above sea level, about 930 above Umballa, and being directly under the hills, will be found uncomfortably hot at night under the punkah; so at daybreak, after a cup of tea, the traveller impatiently calls for the tongha; off rattle the ponies, and every hour in the cool, exhilarating mountain air he grows happier, and begins to think that India is not such a bad country after all. The sick or weakly can travel by dhooly along the old road, resting at Kussowlee, Kukurhutty perhaps, ten miles farther, or still better at Hurrepoor fourteen miles from Kussowlee, in a very nice situation, next at Syree, eight miles farther, and only ten miles from Simla, in my experience a wretched place, with bad provisions and most horribly-tasting soda water. A terrible climb from Syree to Simla, but the invalid will feel better immediately, unless he arrives during the rains, when bad smells, diarrhoea, and dyspepsia may be expected. Distant 187 miles from Lahore, 160 from Delhi, 120 from Meerut, the cantonment of Umballa, laid out by Lord Napier of Magdala, in 1843, and comprising 10,000 acres of land, lies to the east of the town. The station, running north and south, mostly faces the west, and is better wooded on the right side. The grand trunk road running through the station is made up of kunkur, but, according to the report of Dr Kendall, written in 1859, the Mall was formed of broken bricks and the very durable refuse of kilns. As the

visitor looks up the long wide Mall the welcome blue hills immediately in front have a very grand effect when the sky is serene. The public park and gardens, arranged with exceptionally artistic taste, reflect great credit on those attempting to grapple with difficulties connected with heat, dust, and drought. The town dates from the reign of Akbar, who had a palace there. The general situation with respect to surrounding country is low, and formerly Umballa had a bad reputation for cholera outbreaks associated with country inundation and overcrowding in barracks. Cholera and malarial fevers ran concurrently together. Dykes were raised to protect the soil and to divert drainage to the north-east away from the town in a south-westerly direction. One dyke runs through the civil station, the other in direction of cantonments. Unfortunately, the sub-soil water has diminished to the extent of drying up of most of the wells in the town, especially on its western side. According to Bellew in 1877, of forty-five wells inside the town thirty-five were empty, and of the remaining ten only three yielded sweet water, the others being either brackish or saline. Depth of water in these wells ranges from six to sixteen inches. On the west side of the town the depth of the water below the surface is from fifty to sixty feet, whilst on the east side it is only half that distance down. This water difficulty has long attracted attention. In 1874 Surgeon-General Crawford, after alluding to insufficient barrack accommodation and defective subsoil drainage, brought to notice the necessity for increased water-supply for swimming baths, cultivation, and road purposes. In 1859 the land is reported ill suited for wells on

account of fickle quicksands constantly changing the courses of streams. In a report for 1868 it appears that one suggestion was to bring water from the Morni Lakes, from a distance of twenty-eight miles in the Sewaliks; also from the Ghaggar river, about eight miles off. The soil considered good, and favorable for the construction of tanks. Dr Bateson, civil surgeon of Umballa, in 1868 wrote an elaborate paper to prove that fever, spleen disease, and goitre might be due to drinking Ghaggar water, especially in villages where the river meandered through limestone. Dr de Rinzi entirely differed with Dr Bateson. The soil about Umballa is a pretty stiff alluvial clay. There are no marshes, no jungles, and the station is fairly wooded under the circumstances. The climate is hot, the thermometer ascending to 112° in the shade at noon. The dust storms and hot winds are of average severity, and the station is not exposed to cold or variable winds. The atmosphere of the district is affected by irritating dust from April until the rains, usually starting early in June and lasting until the end of September, the amount ranging from twenty to forty inches. Thirty-six in 1873, forty-four in 1874, thirty-three in 1875, twenty-six in 1876, and twenty-three inches in 1877. M'Clelland gives the average as twenty-three, and the mean annual temperature as 78° ; the coolest month 57° , the hottest 96° . Mean temperature—January 57° , February 60° , March 73° , April 81° , May 87° , June 96° , July 87° , August 90° , September 91° , October 84° , November 67° , December 62° . In 1873 the strength of the garrison amounted to 4700 European troops. In 1878 were stationed two batteries of artillery, a regiment of cavalry, another of infantry,

one of Bengal lancers, and a native infantry regiment; also a goodly number of civilians. There are two excellent hotels near the railway, and although there existed a kind of refreshment place at the rest camp, ladies were recommended to try the hotels. Bachelor officers may be elected honorary members of the excellent Sirhind Club, conveniently situated on the Mall, with good shops in close proximity. Since the dykes prevented country inundation cholera outbreaks, severe in 1845, 1852, 1857, 1861, and 1867, do not figure largely in returns. On one occasion, in 1867, in Surgeon-General Monro's time, it was necessary to go out into camp from April 23rd to May 19th, with a temperature of 112°, and without any bad results; women and children were sheltered in rest houses. In the very mild epidemic of 1872 the rainfall was excessive. During the month of August easterly winds prevailed, and the days and nights were specially warm and oppressive. In 1867 all elevated and desirable camping grounds had previously been patronised by pilgrims, and by way of complicating matters the Maharajah of Cashmere, with any amount of tag rag and bobtail appeared on the scene. Diarrhoea may be coincident with water scarcity. Very unsatisfactory cases of erysipelas, and notably of diphtheria, have periodically cropped up. Enteric fever of course will be annually ready to fasten on those susceptible, and even follow the newly arrived lads up to Solon.

Like many other regiments, the 11th Hussars carried enteric about with them for a long time, but at camps of exercise and on all occasions they held their own. Scarlet fever, noted also at Meerut, Jullundur, and Sealkote, occasioned thirty-seven admissions in

the rifle Brigade, recently arrived from home in one of the troopships late in 1874. The type was mild, and prompt isolation checked any tendency to spread. Variola noticed specially from November to March. All fevers high in September, and dysentery also. Diarrhoea in July. Hepatitis from April to October. Respiratory diseases in March. Phthisis from August to October. Rheumatism, with variable intensity, according to heat, cold, damp, or chills, from March to October. Endless aches, pains, neuralgic ailments, mostly malarial, require quinine treatment. For genuine acute rheumatism, the same remedies as in England, especially salicylic acid. Up at rheumatic Dugshai, else Jutogh, or Simla, old officers cursed with gout may ring changes on all remedies, without alleviation of agony, until they return to the plains, where the skin will work again. Compared with Meerut, but little district sport, excepting in the territory of the rich Maharajah of Patiala, whose rubies, emeralds, and diamonds are so celebrated. A number of princes, for instance, Kapoorthella Nabba, Iheend, Nahun, are scattered about, and up in the hills many chieftains, with long illustrious pedigrees, but attenuated purses, may show many little attentions to travellers and sportsmen. Taking all points under consideration, individuals detailed for duty in the Sirhind Circle ought exceedingly to thank their stars of destiny. Not a single bad station, and the cold weather at Umballa is extremely enjoyable.

During the year 1877 about 9185 men, 964 women, 2135 children were sheltered at convalescent depôts, regular hill stations, or temporary habitations.

CHAPTER V

THE HILLS

COMPARED with Netley, the mean temperature of certain mountain retreats, according to books and reports by Blanford, Elliott, Murray Thompson, and others, would be

Name.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Elevation in feet.	Rainfall in inches.	Date of occupation.
Simla.....	40	44	53	61	66	80	75	73	70	67	52	46	7156	76	1841
Dugshai.....	42	43	51	51	58	70	71	71	69	61	54	42	6100	68	1849
Kasauli.....	41	39	49	58	68	72	71	70	66	61	58	44	6335	70	1848
Subathoo.....				77	81	84	79	77					4000	55	1828
Landour.....	38	38	46	56	63	67	63	61	60	54	45	40	7288	78	1828
Chakrata.....	40	43	50	60	65	68	64	63	62	57	52	45	6360	54	1870
Dalhousie.....	41	37	47	54	64	72	71	71	69	57	51	44	6700	86	1871
Dharmasala.....	43	52	52	54	71	74	69	69	68	67	59	52	6000	115	1854
Murree.....	37	39	48	58	65	71	67	65	65	58	49	43	6786	62	1851
Nyna Tal.....	40	47	58	59	69	72	69	69	65	61	50	47	6400	100	1858
Ranikhet.....	45	49	57	67	69	72	67	67	65	61	55	50	6000	50	1870
Darjeeling.....	40	44	51	55	59	62	64	63	61	57	50	44	7167	132	1835
Srinagar.....	40	45	50	56	60	70	73	71	63	57	54	42	5146
Netley.....	43	44	41	49	53	57	64	60	51	42	42	37	70	28	...

Intending visitors curious about Cashmere, are referred to the interesting papers written by Dr G. C. Ross, *vide 'Indian Medical Gazette,'* 1878; also to the 'Guide Book' by Ince, and to endless compilations by literary travellers.

Taking the rainfall in the British Islands as ranging from twenty-four to sixty inches, with an average of thirty-six, the mean in tropical countries is upwards of 200. In the Khasia mountains fifty feet have been registered at the rate occasionally of thirty inches in twenty-four hours. In the west of Great Britain away from hills thirty to forty-five inches contrast with twenty to twenty-eight in the east. At Aldershot sixteen with twenty-six in Woolmer Forest. In these notes the difference between Mooltan and Dharmasala will be found recorded ; and curiously enough duty took me to both places in 1878. The height of the snow line above the sea of 19,560 in North Himalaya, and 15,500 in South, contrasts with 8885 feet in the Alps and Pyrenees.

To theorise about colonization in India, is more than a waste of time, but as the country must ever be held by the sword, the endeavour of authorities is to locate soldiers in healthy situations, wherever strategically practicable. Barracks cost enormous sums ; there are no parade grounds of sufficient size in most sanitaria ; the water-supply is often one difficulty, the heavy rain another, and the life of *ennui* a third. In the first year the young soldier prefers to remain with the regiment, say at Agra, in the second he is all for the hills, and in the third he tries to get up there again, only to return perhaps idle with all his drill forgotten. Wonderful, indeed, is the effect on young soldiers as regards health. The poor emaciated lad cannot be traced in the strong healthy man after one, or still better, two seasons up above. Now that night duties are being diminished in the plains, this renewed capital of vigour lasts a long time.

Old soldiers often derive no benefit, indeed, may sadly be troubled with hepatitis, dysentery, or "them pains." Women sent up with their husbands (as a divided establishment is too expensive, and the man by himself down below might drink all his pay) are very grateful; and as for the children, they become young lions.

SIMLA.—Umballa to Kalka, thirty-eight miles, or five hours easy drive. Kalka to Simla, fifty-seven miles in eight hours by tongha; the hill gradient two feet in every hundred in places rising to seven; the ponies harnessed curricle fashion. Bullock carts require three, and coolies two days' start with baggage. Excellent dak bungalow at Dharampore, fourteen miles from Kalka, and at Solon thirty from Simla. The terminal station is at a little distance from hotels, but conveyances meet the tongha which during the rains may be delayed. Average altitude of Simla 7100. Fir clad Jacko 8048 feet has a circumference of five miles adapted for equestrians. The observatory 7007. Prospect Hill 7140, Elysium 7400, Christ Church 7230. From the latter spot to the end of Chota Simla, the distance will exceed two miles, and in the other direction, through the bazar (arranged in a succession of ledges), the upper road leads to Boileaugunge, three miles off towards the Vice Regal Residence. There are no troops nearer than Jutog, about three miles off, so the Vice Regal band have to endeavour to console European nurses inclined to pine during the rains. Total area about six square miles. Geological formation consists of metamorphic rocks, indurated shale quarried as roofing slate, grit conglomerate, and limestone. The fairly fertile soil made up of decayed vegetable matter

mixed with rock *débris*. About Jacko (800 feet higher than the station) intensely foliated mica schists, and at Boileaugunge siliceous schists noted by Dr May, most of these schists garnet bearing, highly mineralized and traversed by large seams of quartz. The rocks are not good water bearers, and the peculiar shape of the hill summits give but a minimum supply from the rainfall.

The drainage down each great valley is discharged by one large channel, the combination of convergent water courses, and the rush, may be too rapid for hill penetration by rain. In 1869, about twenty-seven springs were counted, of which eighteen flowed steadily, and nine ran dry in the summer; the discharge in some instances a mere driblet; several springs on a much lower level than the houses, often opening into water courses, bringing down polluted streams from higher elevations, and therefore constantly liable to contamination, to account for enteric fever, hill diarrhoea, and dysentery, amongst other diseases. At one time a shaft was run into Jacko at Combermere Bridge, the discharge from the tunnel in January, estimated at 4000 gallons a day, and a natural spring at the same bridge was then yielding about the same quantity. Taking the population as 15,000, the water derivable from springs has been found to give collectively but one and a half gallon a head. A gathering ground fed by several perennial streams has been taken up in the territory of the Rana of Koti, to the north-east of Simla. The water will be led in covered iron pipes to reservoirs in or near Simla, and delivered from these for use in the town. The daily supply for a population of 16,000, esti-

mated at six and a quarter gallons per head. A municipal market on the site of present Racquet Court will provide for sixty-two tradesmen, such as butchers, bakers, buttermen, poulters, egg dealers, greengrocers, and fishmongers under strict sanitary police surveillance. Latrines in private compounds are to be substantially built on a standard plan; nothing to fall or soak into the ground. In the twenty-one public places the roofs protected, the floors laid with asphalte, the receptacles removed and cleaned immediately after use. All refuse removed daily by the municipal establishment in specially constructed carts, after dark, out to a tract of land five miles from Simla, to be buried until furnace and burning arrangements are adopted. For Chota Simla, and part of Elysium, trench system and subsequent land cultivation suggested. Another project calculates on sufficient water for flushing purposes. In the bazar, the grain market, the slaughter houses, the travellers serai, the quarters for 500 hill porters or coolies, the public lavatories, the halting places for horses, mules, cattle and camels, are all to be improved, and over-crowding diminished by extension of native houses in the direction of the cart road, away from Europeans, and admitting so much easier of effective conservancy. Dr Bellew, quoting the report of Captain R. B. Nisbet, also points out that the seven miles of principal thoroughfares form a road which might greatly be improved, and there is a better laid-out mall at almost every other hill station. All these beneficial schemes will cost at least twelve lakhs of rupees, the Government to find five, the municipality the remainder; the water supply requiring seven,

perhaps more, to be borrowed on security of octroi duties, also income from ground, house, municipal buildings, garden and forest, and conservancy tax on servants. The bazar commences on an elevation of 7084 feet, gradually sloping to a great depth down the valleys. Fires and land slips occasionally occur, but until certain filth saturated spots are blown up, destroyed by disinfecting earthquakes, else for some reason abandoned by inhabitants, the health of the community, now endangered by polluted water, will remain at the mercy of the foul air steaming up the dirty muggy ravines at times. Besides the officials, and their numerous European, Eurasian, or native clerks, with frequently heavy families, too many visitors at present annually flock to Simla to strain the water supply, and to start disease, instead of shaking off old ailments. Plenty of money required to meet the endless expenses connected with well-situated houses or hotels, with clothes, jampans, and the business of pleasure. Not a few persons go up for amusement or mild flirtations, else to display their *remarkable* talents as whist players, artists, actors, singers or musicians, else to look out for local, temporary, acting, officiating, or still better, *permanent* lucrative appointments in healthy stations. Not a few young officers do more harm than good to their constitutions and their cheque-books by late hours, generous living, and card-playing. Miserable work is to lie sick at the club during the rains, or to return at the end of leave with heavy bills to meet, and nothing but vain regrets to contemplate.

Simla is exceedingly beautiful, what with the graceful deodars, the firs, oaks, and damask rhodo-

dendra; the glorious scenery, and the snow panorama. The trips into the interior away from smells and bad water, will prove very enjoyable. The early spring and autumn months are pleasant. Towards the end of February the sun shines softly, the air is cool, the nights are clear and frosty. In January or February the thermometer may sink to 27° or even 22° in the evening, or the chill of the morning. March may be stormy with rain, hail, and even snow up to the middle of April. Then a period of dry weather, with occasional showers, the thermometer rising from 85° to 92° , and people complaining of heat. The rains may commence as early as May 4th, or as late as July 2nd, the usual time about the middle of June or beginning of July; the annual amount ranging from 50 to 100 inches. During July the downpour is incessant, the mountains are enveloped in mists, the air resembles a vapour bath, and yet people struggle out in waterproofs to dinners, concerts, balls, and theatricals, as stopping at home in damp cottage, hotel, or boarding-house becomes wearily monotonous and not half so comfortable as the spacious bungalow down in the plains. Perhaps the chimney is out of order, the rhododendron wood refuses to burn, or the house so built against a bank that the bedroom is always wet, and the callous landlord turns a deaf ear to complaints.

Towards the end of September, sometimes earlier, the rains cease, the clouds vanish, and most bright, bracing, glorious, exhilarating weather will follow. October is the month of all others when Simla appears most lovely, and proves certainly most invigorating just at the time when, with heavy hearts, visitors have to

quit this mountain paradise, which in November becomes still more enchanting. Frost then commences. From the end of December the winter may be very severe, perhaps with a snowfall of two feet or more at one time. To the handful of residents who remain, frozen up yet well provisioned, Christmas in some respects will remind them of England, and young children feel no ill effects from the cold. Several hotels, boarding-houses, and private dwellings, unfortunately are located down ravines ; but if sanitary matters are daily rigidly looked after, the inhabitants enjoy almost equal good health with those perched higher. Towards Elysium and about Jacko there are splendid plateaux, clear of everything, and without any hygienic objection. Very properly these charming sites are occupied by the rich, the prosperous, who have won the golden spurs, or the glorious laurels of success as soldiers or civilians. Rents of ordinary houses (probably 350 in number) ranging from 400 up to 2500 rupees for the season. Already, in October, 1879, water is laid on and flowing through the pipes under the Mall to Chota Simla, and to Boileaugunge. At intervals stand little iron posts with taps from which all comers may help themselves, and the reservoir near the church is progressing. The Mall is watered every evening, and the Horticultural Society are starting a shaded esplanade with eight lawn-tennis courts in the centre of Simla. A railway is projected to Solon. Dr de Fabeck has designed, in Swiss-Italian style, a building on the ridge to be an assembly room, a theatre, a promenade, a library, with offices, shops, meteorological observatory, and Turkish baths ; also with vaulted galleries for the shelter of jhampanis and

ponies during the rains. During the reign of Lord Lytton, Simla has been kept cleaner and well lighted. Amongst recreations ought to be mentioned the skating rink, of fleeting fluctuating popularity according to weather. Club members unable to obtain chambers will find Harding's hotel convenient and economical. At the same time their privileges enable them to invite dinner guests, and in the shape of dances and picnics, to make some attempt to return unbounded local hospitality. When tired of Simla, the restless go 140 miles to Chini, famed for its dry, elastic, congenial atmosphere, a moderate rainfall, and a climate bracing and healthy, surpassing that of Switzerland.

DUGSHAI.—About three miles from the cart road, nineteen from Kalka, forty-two from Simla; the bare rocky hill rising abruptly, almost devoid of trees or cultivation. Besides a military prison, there is a fair-sized bazar. The community consists of one regiment, a detachment, and some sickly married families from Umballa. Overcrowding occasionally may account for sickness, but as a rule, the drainage is good, and certain barrack improvements, especially with reference to lighting and ventilation, will increase the salubrity of the station, which answers admirably if sickly regiments remain there two years. According to reports the drinking water is drawn from a spring half a mile below the barracks and 150 feet below the bazar. Other uncertain springs, yielding small and fluctuating supplies, flow from the hill sides. Geologically the purple sandstone has some peculiarities. Beyond coarse grass after the rains clothing places with beautiful emerald patches, the hills look bleak and barren. Free exposure to

prevailing winds. Hill diarrhoea formerly greatly troubled during the rains, especially men stricken with Peshawur fever, with hepatic or splenic complications. Even now malarial rheumatism may prove tedious. In May, 1857, a regiment marched from Dugshai to Umballa, about sixty miles, in thirty-eight hours *en route* for Delhi. Cholera broke out and also fastened on the regiments hastening down from Subathoo and Kussowlee to quell the mutiny. From 1852 to 1875, Dugshai has only twice suffered from cholera epidemics, and without any particular reason may entirely escape when surrounding peaks and valleys are smitten; for instance, in 1867, and in a less marked degree in 1875, when also Subathoo and Jutogh enjoyed capricious immunity. Leith Adams the naturalist, when quartered at Dugshai in 1851, made several excursions to the Chor, a mountain elevated 10,688 feet. In March his game register included barking deer, hares, pheasants, black-, grey- and red-legged partridges, bush quail, jungle and pea-fowl. In October the lower ranges resounded with the loud screams of the pheasants in shoals. The sportsmen feasted on monal cutlets and delicious partridges, and after eleven days of uninterrupted happiness, his party bade farewell to the Chor and its splendid scenery. The scenery remains, but the birds cannot be answered for.

KUSSOWLEE.—About forty-six miles from Umballa, nine from Kalka, and thirty-three from Simla, a convalescent dépôt for sick soldiers and also a sanatorium, by many quiet people preferred to Simla. Formerly the place had a bad reputation for hill diarrhoea, filth fevers, and scorbutic dysentery attributable to damp fogs, faulty conservancy, over-

crowding, bad barracks, want of vegetables, and the usual stereotyped objections, which were gradually rectified. The hill summit and northern slopes are covered with pines, and cultivation is conducted on the narrow terraces extending down the deep valleys. The sanitarium is surrounded by independent territory. The drainage is perfect. The sides of the hill are so precipitous that no water can possibly lie on it, and as it consists in the main of bare rock there is little or no lodgment for subsoil moisture. The water-supply is drawn from a splendid spring 1000 feet below the barracks, and is carried up in mussels by mules. This reservoir was, in Dr Mackinnon's time (1872), uncovered, unprotected, and exposed to contamination. Various improvements, starting with a pump, were then suggested. At that time, also, some of the old faults had crept in to demand the usual penalty. The dépôt strength amounted to 700. Dr May analysed the water of the military tank, of the sappers and miners' spring, and of the brewery stream at one time, with very satisfactory results, as regards abundance and original quality, yet indicated the dangerous risks of pollution. In the report of 1872, Bryden mentions a remarkable instance of a body of persons who had been attacked with cholera moving out of the station to a neighbouring hill, continuing to draw their water from the same source as before, and yet remaining free from the date of their taking up their new position. Facts then went to support the idea of disease localization independently of water poison. No particular barrack attacked, and cases, on this occasion, were stricken here and there in erratic fashion. Very heavy rainfall between June 23rd and September 23rd, eighty-

two inches were registered more than in any year since 1861. According to one authority, the average rainfall for nine years would be seventy-two inches, of which fifty-six fall during the four monsoon months. In August, 1872, one camp formed on a ridge near Gurkhul, about one mile to the north of Kussowlee hill in a direct line, or four miles by the road, answered admirably. Here remained until September 30th, about 4 officers, 180 men, 10 women, and 24 children ; the cholera cases separate from the rest. Another camp below the hospital to the southwest, on a ridge 700 feet below the station, and exposed to thunder, lightning, and rain, had to be moved to higher ground. In 1875, the strength of the dépôt consisted of 538 men, 84 women, 199 children ; total 821. Native population of cantonment 1400. On the night of July 3rd, within a few hours of the time when the severe outbreak of 1872 commenced at the station, another visitation of cholera started. The weather unpleasantly warm, damp, and foggy, the prevailing wind easterly. One family barrack located near a bazar and a dirty ravine had damp flooring. Twelve cases occurred in camp at Gurkhul, chiefly among those who had recently left barracks. Tents were provided with boarded floors, and charcoal was issued as fuel for drying wet clothes. Kussowlee hill has a circuit of five miles, and from the plains, the ascent is very abrupt. Rice, ginger, various grains, turmeric, onions, potatoes, and native vegetables grown. Very fine views of the plains, the windings of the Sutlej and Jumna rivers, but, as a rule, people prefer to look the other way at the Lawrence Asylum at Sanawar, the barracks up at Dugshai, the buildings down at Subathoo, the

barracks at Jutogh, the white houses at Simla, the grand old mountains, and the distant silver snows. At Kussowlee, a nice little church, a dismal dak bungalow, one or two fair shops, a capital hotel adapted for married or bachelor officers, and the cottages are very comfortable. Of course, recreations are on a limited humbler and milder scale than at Simla ; still, reasonable and contented persons may spend their leave with great pleasure at Kussowlee, and with great profit as regards health.

SUBATHOO.—All things considered, in my humble opinion, Subathoo could strongly be recommended as a health resort for *selected* cases of asthma, bronchitis, phthisis, rheumatism, neuralgia, certain phases of dyspepsia, hepatitis, and chronic diarrhœa, malarial cachexia, and the wasting diseases of children, *provided* all arrangements connected with accommodation, food, water, conservancy (not forgetting ice and punkahs in private houses in May and June) be properly managed. In the ' Indian Medical Gazette,' 1878, pages 60 and 91, will be found all the information I could then with difficulty obtain, and much of which now would not be applicable, as old barracks have been evacuated, overcrowding has ceased, and numerous sanitary defects are things of the past. A champagne glass on the dinner table gives some idea of the position as compared with the flat plain below ; at the bottom of the glass would be Subathoo, 4253 feet, with Kussowlee, 6335, the Sanawar Lawrence Asylum, Dugshai, 6100, the Crole Mountain, Simla, Jutogh, 7100, and hills above the native states perched at intervals along the rim of the glass above. Very grandly do the lofty stations tower above and around the depressed site of Subathoo,

the latter very hot and stuffy when the warm air stagnates on still sultry nights. Punkahs at mess were absolutely necessary, and white clothing reminded one of the plains when the temperature reached 90°. The formation mostly consists of clay slate, and limestone in crumbling strata ; and rugged rocks stained with iron, occasionally glistening with mica, else showing indications of lead or copper. Geologists allude to certain gritty, lumpy, bright red clay, and fine-grained, massive sandstones ; to red and grey, marly, nummulitic clay ; to rocks like porcelain in contact with slates ; to remains of land plants, trees, and shrubs, grown probably on islands of the Crole rocks. Many fossils, not merely of fig trees, palms, and grasses, but also of shells and sea fishes there noted, besides those of animals. Irregularly placed on a ridge, two miles long, half a mile broad, the subtropical station of Subathoo appears, at first gradually then abruptly sloped from the Dugshai range, running north and south with deep valleys on each side. Spreading out east and west this ridge is intersected by water-courses draining down the ravines. In this climate decomposition being comparatively slow the rocks, ravines, and water-courses are liable to filth pollution, especially in seasons of scanty or irregular rains. Evolving at night the heat absorbed by day, the bare rocks peep out in so many places that beyond scanty herbage, cactus, stone crop, and the marvel of Peru, the hill sides in some directions are drearily barren. On the hard parade ground (500 yards square) slowly struggle the lilac hibiscus, the ruddy lagerstromia, a few toon and poplar, whilst scattered about are sickly-scented babul trees, occasional rare

specimens of chir pine, peepul, cypress, sissoo, sal, bakain, and willow. Neither bael, deodar, rhododendra, holly, or mistletoe noticed. Up at Kussow-lee, ten miles south, rustle the beautiful pines ; up at Simla, twenty-four miles north, are the graceful deodars ; up the bold and lofty Crole mountain the dark forest stands out in prominent relief, and at Solon, elevated 5000 feet, flourish the walnut trees, which, preferring a rich and deeper soil, altogether shun Subathoo. Up the hospital hill, however, about on a level at the summit with Solon, grew the dandelion, the scarlet geranium, and the tomato, besides any amount of hemp and datura admirably adapted for anodyne poultices and fomentations. In the few gardens the most thriving flowers were dahlias, tiger and crocus lilies, different varieties of portulaca, verbenas, pansies, and petunias. Near my house one or two trees were laden with small plums, tasteless apricots, quinces, pomegranates, small figs, limes, and hard pears. In the bazar natives sold indifferent crab apples, mulberries, guavas, plaintains, loquats, also fair melons, but very poor grapes, strawberries, raspberries, and mangoes from neighbouring valleys suffering from want of rain. Drought also told on the soldier's garden, about 600 feet below the barracks. Pumpkins, onions, carrots, parsnips, cabbages, turnips, cauliflowers, cucumbers, and tomatoes, capable of improvement. Excellent potatoes, an anna the seer in the bazar, were not procurable when most required. Soldiers should either be compelled to keep up gardens, or else the commissariat to have entire control with sufficient staff. The toiling up and down the hot ravine, the want of water, the poor

soil, the ravages of birds or insects, are apt to discourage amateur intermittent cultivators, who next turn their attention to collecting beautiful moths and butterflies, partly for the love of natural history, and partly for the love of beer and rum procurable after a profitable sale of boxes. Total abstainers save money.

It is a moot question about utilising adjacent conservancy trenches, taking into consideration the position of the barracks overhead, the slow decomposition, and the tendency of pestilential vapours to be wafted up ravines at night. Potatoes do not thrive in the shallow soil. Crops of the district include wheat, barley, maize, millet, red pepper, excellent ginger, a small amount of cotton, opium, tobacco, and rice. In the bazar, with its population of 3000, no pigs were kept. The slaughter-houses, the beef and mutton shops, the meat exposed for sale in gauze safes, came under supervision, and no specially noxious trades were conducted. Dyers and shawl makers, perhaps, the least desirable. The average weight of hill sheep, mainly fed on leaves and berries until arrival at the Commissariat, when they receive grain, would be twenty-five pounds. The general average weight of a carcase of beef about 160 pounds. Meat keeps three days in cool, yet scarcely fourteen hours in hot or rainy weather. Feeling the want of rain and pasture, cattle and sheep sickened in 1877, as did poultry, whilst goats and mules kept well. A cow costs from eight to twenty-five rupees, and yields, on the average, six pints of milk, but hill cattle supply a very indifferent quality; also are never purchased for slaughter, as the flesh is not good, and the fat has a sickly red

colour. A goat costing from three to six rupees yields, on an average, a pint of milk; the breed poor. Much of the barrack milk the goats supply. Cows suffering with enteritis at once run dry. Both cow and goat's milk very liable to adulteration with dirty water, especially from a tank 176 feet long, 111 wide, 5 deep, near the mess, and only intended for watering mules and shrubs. Including those in officer's compounds, about thirty wells were counted, some shallow, narrow, unprotected, and not a few containing surface water. In July the raised covered pump spring well near the canteen, twenty feet deep, contained five of water, the bakery well, twenty-two, with nine, and another in a private compound had sixteen feet of water of excellent quality. All the small wells are apt to run dry, and it becomes almost impossible to prevent foul water being brought from tanks, puddles, or pools, for drinking purposes. The scattered barracks, with the hospital on a hill, Dugshai direction, occupy the southern extremity of the station towards Kussowlee. About 170 feet below the last barrack, away from Simla and 518 feet below the hospital, are two covered tanks of stone and cement, carefully locked and periodically cleaned. About 100 feet apart each reservoir is connected, by a small stone tunnel, with underground springs, one twenty, the other forty feet distant. Occasionally these channels leak, when the tanks become empty, and the water flows down the khud for the benefit of adjacent trees (mostly willows) and crops. The total yield of the two covered tanks has been roughly, perhaps incorrectly, calculated to exceed 8000 gallons daily, and, according to tradition, the springs never fail. Eighty

mules, each laden with sixteen gallons, should make four daily trips to carry water over a mile to some scattered barracks, also another mile, by a zigzag road, to the hospital. In seasons of drought it is only a money question sending down to a river, and for bathing purposes married people may supplement their allowance by purchasing water at a pice per mussack. Some are thoughtless enough to rob their neighbours by taking water out of the Macnamara filters for washing floors or lavatory requirements. Flowing through limestone, the spring water is somewhat hard, but in other respects, very good. At the other end of the station is the parade ground, with the canteen, the commissariat offices, and the bazar commencing on a hill forty feet below, in one direction, and in the other the mess. A few houses on the Kussowlee side of the parade ground, but the majority are on the other, dotted about a hill, Simla direction ; not twenty houses altogether, a few supplied with private wells, else dependent on the canteen, as the above-mentioned pump tanks are too far off. Soldiers contrive to find bathing places occasionally ; for instance, in a stream on the Solon road. Out on butterfly excursions down the green valleys thirsty men are very careless about drinking from any dirty rill or rivulet.

There being no permanent Observatory at Subathoo, and as regiments carry away their records, it is impossible to enter into meteorological details. Though hotter than other hill stations, and, by some, considered an imposition in that respect, still Subathoo, properly used, is vastly superior to the plains. The winter is not severe, the heat, after all, is nothing much, and the rains are very tolerable

as compared with the hills above or the plains below. There is less fog, damp, and mist, and no great range of temperature. Rainfall about fifty-five inches. Mean temperature said to exceed 70°. Up at the hospital, so placed on a hill as to resemble an old castle on the Rhine, the air would be very different to that of the station below ; the refreshing breeze and cool nights are greatly appreciated by the sick. In June, 1876, the temperature stood 93° at 4 p.m. The following temperatures were recorded in the upper wards of this excellent, comparatively new, double-storeyed building.

	7 a.m.	12 noon.	5 p.m.
January, 1877	46—54°	48—56°	46—56°
February, "	44—50	45—59	44—59
March, "	50—60	52—64	51—64
April, "	54—67	56—69	58—68
May, "	61—76	65—84	67—85
June, "	70—84	72—87	72—88
July, "	72—82	74—85	78—85
August, "	71—82	74—85	71—88
September, "	71—76	75—79	74—80
October, "	62—76	62—78	63—76
November, 1876	55—62	58—64	56—63
December, "	51—57	55—61	54—59

There are no hot winds, but often the air may be loaded with dust. Air, vapour, rocks, and soil absorb heat. Blanford explains that cool air draining off mountain slopes, will flow down valleys as cold winds at night and early morning. There are no marshes, but from gardens, conservancy trenches, burial grounds, or defiled ravines, heated, muggy air, ascending to replace cool currents, may tell on general health : when the dirty rocks re-

quire flushing torrents of yellow turbid water to clean the unwashed gullies. In April and May, 1877, days and nights were often oppressive. April 17th—rain clears the air, temperature falls to 66° . April 20th—beautiful morning, fine bright atmosphere, snows very clear. April 23rd—dust storm, temperature 80° in verandah near parade ground at 3 and 5 p.m. April 29th—white clothing worn. April 30th—thunder, lightning, rain, and hail. May 4th—heavy rain from eleven to two, followed by a bright afternoon, and according to tradition, such is the usual convenient course of showers instead of a steady depressing deluge. When the higher elevations are obscured by white, floating, fleecy clouds of white foam, suddenly turning to angry black, the varied landscape about Subathoo, here red, there blue, and in other directions a rich green, radiantly smiles in the golden sunshine. May 26th—the temperature of 85° , personally contrasted with 65° at Simla, and riding back to Subathoo next day found it 88° in doors when breakfasting late. June 28th—rain at 5 p.m. reduced temperature from 90° to 79° . About this time enteric fever commenced to occasion great anxiety. Subathoo for a long time had been blamed as the home of a typhoid form of malarious fever, ever ready to recur in certain seasons when a light is applied to inflammable material. Soldiers were in the habit of purchasing rugs stuffed with native clothes, probably saturated with portable typhus. The long and tedious annals of cholera tell of extraordinary immunity at one time, and of special solitary attacks at another. From 1843 to 1877 this disease noted thirteen times, epidemic in 1845, 1867, 1869, and non-fatal on seven occasions.

Dr Tulloch, in 1874, was of opinion that the climate was not adapted for pulmonary diseases, but Sir Charles Napier, Surgeons-General Munro, Crawford, and others, instead of blaming the station, reported the old barracks to be over-crowded, badly situated, dark, badly ventilated, inconveniently constructed, and extremely damp. Natives suffer from fevers, goitre, leprosy, paralysis, and constitutional degeneration dependent on vice and polyandry, which latter social custom is regulated on financial principles. But little rheumatism or diarrhœa at Subathoo as compared with higher elevations. A few women were sick from April to October, and in spite of heat and drought, properly tended children throve amazingly. Very charming are the winter months, especially for weak-chested persons. Cases of erysipelas, convulsions, croup, diphtheria, depend more on house surroundings, on diet, management, and constitution, rather than on climate. In December and January the unusual circumstance occurred of four inches of snow remaining on the ground two days, and the hailstones were unusually large at this season, when the general health was excellent. It cannot be denied that to the idle, or those unable to cut out resources for themselves, Subathoo is a dull place. A very nice library at the hospital. Officers play polo on the hard parade ground, else get up theatricals, concerts, penny readings, temperance societies, cricket, football, and pedestrian matches for the men who greatly enjoy the free-and-easy "dog-and-stick" marches along the Durrumpore road. Very little sport beyond quail and partridge, miles away in the direction of the majestic Crole mountain. Leopards and hyenas, foxes, snakes, scorpions, monkeys,

scarce. The cuckoo most noisy in May, and the mynas chatter excessively. Fine hawks, jackdaws, green pigeons, golden orioles, and humming birds. Of an evening the cries would be heard of magnificent eagles soaring over the deep ravines, and most impatiently waiting for the commissariat butcher to commence his professional duties.

LANDOUR.—The first, and for many years the only, hill Sanitarium, *vide* 'Indian Medical Annals,' volume 6, page 291, also the elaborate reports of Dr Ludovick Stewart and of Dr Young Kellett, in the 'Army Medical Department Blue Books' for 1862 and 1871. Leaving the railway at Saharanpore, about fifty miles are accomplished in a three-horse omnibus, along a rough, undulating road eventually dipping into a lovely valley, the Deyra Doon (2000 feet), on the other side of the Sewaliks, then to Rajpore at the foot of the hills. The remaining nine miles of ascent to the highest barrack at Landour, 7580 feet, accomplished by pony, dhooly, or jampan. Perhaps the traveller may wish to halt at Mussoorie, 800 feet below Landour, and as compared with Simla sometimes styled the Ramsgate of India. To the west of Landour, and distant about one hundred miles, are Simla, Kussowlee, Dugshai, Subathoo, and eastward are Nyna Tal, Almorah, and Ranikhet. Landour is about 120 miles from Meerut, and about 40 from Roorkee. There is no table land, and the general appearance is a series of hills, with deep valleys, steep precipices, or long sloping banks, down which trickle rivulets and torrents, according to season. Roads, houses, building sites, and garden patches, have ingeniously to be cut or scooped out of the hill sides. Some white cottages cling like limpets to the ledges, else are

fantastically constructed on sugar-loaf-shaped summits. From Landour, looking south, lies the beautiful valley of the Doon, beyond which rise the Sewaliks, and far beyond again are the sultry horrid plains, in which to the east and west may be observed the silver threads of the Ganges and Jumma meandering away into the far distance. To the north, and separated by a confused mass of mountain, much of which is densely wooded, are peaks of the snowy range, from 18 to 22,000 feet elevation. Snow has fallen at Rajpore and even at Deyrah, about fourteen miles by road from Mussooree. The geological formation chiefly clay slate, and limestone, the latter often in the shape of pure sulphate. There are beds of sandstone and of marl rich in organic remains, with traces of primary rock, besides granite veins of trap, chiefly green-stone. Traces of iron, lead, and copper. Down in hot feverish valleys, difficult of access, are sulphuretted hydrogen and also chalybeate springs, said to be beneficial for certain gastric, hepatic, and cutaneous derangements, when the water is drank fresh. Rheumatic bathers have also found relief for their crippled limbs in certain pools in malarious ravines. The trees include a worthless oak, the cheer pine, deodar, yew, juniper, and at the foot of the hills sal and bael. During the rains oaks and rhododendra are clothed with luxuriant masses of ferns, hanging in graceful festoons from all the moss-clad branches, interspersed with various beautiful orchids, which soon wither. Dr. Stewart, who collected seventy varieties of ferns, gives also a long list of mammalia, and especially of the birds. On the hill sides grow the ordinary cereals, and excellent potatoes are culti-

vated. To the best of recollection, one hill was a bright blaze of varied colour of monopetalous dahlias, annually degenerating from European into Eurasian, eventually into native, mean, shabby, tawdry flowers. The hill summits of lime and sandstone are good water-bearing rocks, the springs issue from the convex sides of slopes. The open ravines do not to any extent act as sewers. The hills are comparatively bare of trees. The houses at Landour are not crowded together. The analysis proves that the quantity of dissolved saline matter is so small, and also the quality so harmless, that altogether the drinking water is far superior to that of Simla. Excess of lime, a minute amount of chloride of sodium and of volatile matter, derived from vegetable decomposition, such as dead leaves, were the prominent characteristics. Many of the springs carefully looked after by the owners. The climate is delightful, and in the various seasons remarkably equable. "Its warmth is not heat, its coolness is not cold," quotes Stewart from an Eastern proverb. Landour and Mussooree are much brighter and warmer than England, their air and water are purer, and they are free from all endemic disease. "Perhaps the purest air breathed by man is found in the Himalayas close to the snows; consequently at Landour it is almost as good, except where tainted by man," writes Kellett, who proceeds to show that the climate is specially suited to phthisical cases, who almost invariably improve, and often recover, according to the medical reports of forty years. Warm, dry, rarefied, and having a moderate range of temperature, the air is sedative, astringent, tonic, opposed to congestion, to deposits and their organisation.

At high altitudes the respiring of highly rarefied air is considered to cause an expansion of lung-tissue and to produce new healthy growths, inducing reparative action in diseased parts. Of course, when much lung-tissue has been destroyed, removal to the hills only hastens the end by spasmodic dyspœa, palpitation, and hæmoptysis. No hill diarrœa in a place where the rains thoroughly wash the precipitous mountain sides. Snow in January and February. Not much wind, except in February and March, although there is a regular, almost imperceptible current from the snows southward. In May the weather is tempered by the cooling breeze from the Dhoon by day and from the snows by night. About the middle of June, ushered by thunderstorms, the rains commence, reaching a climax in August and lasting well into September; the breaks delightful, but slight attacks of diarrœa and febrile relapses may then occur. Cold weather sets in very gradually about October, when the sky is deep blue and unclouded and the elasticity of the air most invigorating. Hail and snowstorms gradually follow, and shaded spots are covered with frost and ice. Mussooree is then deserted, and up at Landour Convalescent Depôt remain selected cases for the winter. Stewart gives the rainfall as 85, which in 1860 increased to 140 inches. Kellett publishes voluminous charts and tables, all interesting and well worthy of transcription. For instance—

	Mean temperature.		Mean daily range.		Humidity.	
	Greenwich.	Landour.	Greenwich.	Landour.	Greenwich.	Landour.
January	38	38	9	11	89	49
February	38	38	11	11	85	65
March	41	46	14	14	82	45
April.....	46	56	18	16	79	42
May	52	63	20	14	76	53
June.....	59	67	21	11	74	58
July	61	63	20	9	76	78
August.....	61	61	19	88	77	88
September	56	60	18	10	81	78
October	50	54	14	12	87	65
November	43	45	11	14	89	57
December.....	40	40	9	11	89	54

The mean temperature of Landour about 55° , about 5° higher than Greenwich. In the winter it is many, and in the summer a few degrees warmer, particularly in April, May, and June. But very few private houses at Landour, about eighty, and the patients or weakly persons at the dépôt are under military control, so that all sanitary arrangements connected with water, conservancy, servants' houses, general cleanliness, and disease prevention, ought easily to be worked as on board a man-of-war. The bazar, inclined on the road down to Mussooree, is open to the objection of liability to water pollution in certain seasons, and in 1870 it was suggested to deepen the Landour tank, and to place stopcocks or plugs in side walls to prevent the water-carriers creating nuisances with their mussels. In the middle of one hot weather men with bad fever, spleen, and liver, were sent off from Agra. The men travelled by rail to Saharanpore in one night, lying down in first-class compartments. The following night they pro-

ceeded by horse dak and dhooly, and next morning were at Landour Hospital, in an English climate, and thus their comforts and prospects of recovery were immeasurably increased.

The summit of Landour is a mile long, the hill paths fairly adapted for invalids on foot, else in dhoories, to enjoy the glorious scenery and the pure, refreshing, life-renewing air beneath the snows. By all accounts it is the *very best* place in India for European children. But Landour is not Mussooree with its hotels, club, boarding houses, shops, college, convent, orphanage, private schools, perhaps crowded cottages, and a population exceeding 6000. The weary old song of bad sanitary arrangements, and the want of autocratic coercion to compel the community to keep disease at a distance, appears sung in vain, for in damp weather those mysteriously allied diseases, erysipelas, diphtheria, and puerperal fever, may appear when invited.

CHAKRATA.—A hill station over the Western Doon, three marches from Mussooree; started in 1869; accommodating but one regiment. Scanty water-supply, the hill-side springs of hard quality, containing much lime and magnesia in solution. Five streams recommended for use in 1870. One tapped six miles from the parade ground, and issuing from a dark valley elevated 7700, to be introduced through a covered-in masonry canal to a reservoir 150 feet lower, and the water thence distributed by means of iron pipes. The mean temperature in 1878 ran—April 53°, May 62°, June 66°, July 64°, August 66°, September 64°. Rainfall fifty-seven inches. The difference between the temperature of Chakrata and Roorkee, down in the plains below, has

been calculated as—January 16°, February 17°, March and April 20°, May 22°, June 21°, July to September 19°, October 17°, November and December 12°. By all accounts the winter is severe. The cottage barracks consist of a centre day room, twenty by forty, with four dormitories, two on either side, each dormitory thirty-five by twenty-two, with a height of twelve feet from floor to wall plate; the floor raised two feet above the ground. The building to accommodate forty men and two sergeants in end rooms. Cholera noted in June, 1870, and August, 1872. Excessive rain, foggy days, northerly winds; no overcrowding at that time. Mild ague, diarrhoea, bronchitis may trouble. By report a dull healthy little hill retreat, with Mussooree conveniently near for those able to take frequent trips during the season or breaks in the rains. Fairly wooded. A little sport.

DALHOUSIE.—One of the best of hill stations; has to contend with certain obstacles prejudicial to popularity. A long journey is it after the rail to Umritzur to drive sixty-seven miles in nine hours to Pathankote, then by dhooly, fifty-two more, for fifteen hours, up to the Sanitarium, ranging from 6418 to 7687 feet above sea level. No club, no civil or military magnates, no great attractions for simply pleasure seekers. Thanks to Lord Napier of Magdala and to Sir Donald McLeod, the health advantages attracted attention in 1861, when house building commenced. Troops were tented here in 1856, and during the mutiny a few ladies sought shelter in a hut at Potraine. In 1868 soldiers appeared at Baloon, and in 1871, including working parties, 1000 men were somehow lodged. In 1878 a new

road, starting twenty-five miles below Dalhousie, was opened, said to be from eighteen to twenty feet wide, the average fourteen, the gradient fair, the stratum of lime and ironstone soon dry, the bridges constructed to stand the strain of treacherous torrents or melting snow. A cart should carry ten maunds, a camel eight, a mule three. When the rail runs from Umritzur to Pathankote both old and new roads will require considerable alteration to facilitate passenger traffic and the carriage of goods up the tortuous mountains. This so-called cart or camel route in certain directions is a tedious, exhausting crawl, below perpendicular cliffs and above most frightful precipices. During or after rains or at any time, chunks of conglomerate may fall on coolies; for instance, when my boxes were smashed and the contents pitched down the khud in April, 1878.

Proceeding by the old road past Bakloh (a Goorkha station, 4700 feet elevation, and established in 1866) the traveller's dhooly arrives at the church adjoining the post-office, from whence, along the lower Terah Mall, he can be conveyed in a few minutes down to the Bull's Head 150 feet below, else a little farther up to the Strawberry Bank Hotel on the summit of Potraine, elevated 6820, compared with Terah 6874, and Bukrota 7687 feet; the three hills connected, the distance from one extreme point to the other about four miles. The different mountains, well wooded, are ascended, connected, traversed, encircled figure-of-8 fashion by excellent paths, in certain directions adaptable for tongha driving, and so soon dry immediately after heavy showers that pedestrians escape all irritating annoyances of mud, slush, or red clay. Geologically the formation con-

sists of the usual slate and beautiful, greyish-white, granitoid gneiss, more like marble. Potraine is schistose. In quarries on the Pathankote road are excellent slates, adapted for flooring but not roofing barracks in hot stations. Poor coal, good lime, fluor spar, garnet, quartz, oxide of iron, tourmaline, lead, copper, silver, noticed by explorers, and in river sand minute particles of gold obtained by patient washing. Chalybeate waters found near Chumba, saline streams in Kangra direction, springs containing iodine, bromine, sulphur, about Dalhousie, and a hot jet at Doneira. Only a few houses absolutely on Potraine, not six, and the bazar, here commencing on an incline 350 feet below, cannot be injurious to Europeans, unless servants carry sickness into houses. Most of the Terah houses are dotted at good intervals on the summit, about the base, or on ledges looking towards the plains, towards Dyne Kund (9000 feet), a noble mountain dark with horse-chesnut trees, or towards the snows. Not a hundred houses altogether, scattered over an extensive area, and likely for many years to escape filth fevers. These houses, mostly double-storeyed, slate roofed, range in rent from 200 to 1200 rupees. On the third and lofty hill, Bukrota, are the best building sites, with the advantage of a good level road, two miles long, called the Upper Mall. Beyond Bukrota is a charming and well-wooded mountain forest, Kala Tope, on the Chumba road. About fifty miles distant, as the crow flies, the Gurdhar needle rock, 21,000 feet high, occupies the highest throne above the many snow waves, peaks, and pinnacles. There are no wells, but in addition to reservoirs along the water-course track a few springs or streams supplement

supply; for instance, at Kuttullugh (5377), up at Bukrota (7000), filtering down 400 feet to the lower Chumba road extremely pure, yet uncertain, and down at Banikhet a rill over bamboo, between rocks, mosses, and jungle, yielded daily in June 640 gallons. In various directions the trickling rivulets of dry months swell periodically into torrents, and the usual nuisances created by human beings, mules, cattle, birds, rotting leaves, or general refuse annually recur.

The population is widely scattered (scarcely 3000 natives in the two decent bazaars), the rainfall ranges from sixty-two to over one hundred inches; the incline leads dangerous streams away, and the washings of dirty slopes are rapidly carried down, else absorbed by trees, shrubs, roots, and grasses. Beyond unavoidable lime impregnation the quality of the drinking water at starting is excellent, indeed remarkable, in its purity, and in quantity sufficient for ten times the population. The springs have their home at Dyne Kund in Chumba territory, the summit capped with snow till the end of April. It has been suggested that by arrangements with His Highness the Maharajah this particular spot might be included within cantonment bounds for sanitary protection, as regards cattle and squatters, were there not political objections. The area of gathering ground feeding the springs is about a square mile, and the combination forms a stream between Bukrota and Dyne Kund down a valley two miles from the church, and about four miles from Baloon Barracks, which are about 400 feet below Terah Mall, and according to my aneroid 1000 below this valley. At this glen are two connected open stone reservoirs (one for settling),

each adapted to contain 72,000 gallons. Under-ground pipes next convey the water towards the church, and next down an incline (the pressure broken by two small tanks) towards two locked-up brick storehouses above Baloon Barracks, adapted to hold 87,306 gallons. From here pipes and hydrants distribute the water to the barracks, accommodating 400 convalescents, 14 women, 30 children, and supplied with Macnamara filters. For the civil population an open stream runs from the glen to the church, thence through a masonry tunnel of flagstones under the Mall contouring Tera, on to Potraine, and next along an earth-cut down to the bazar and the green valleys below. At intervals are covered reservoirs with spouts. The amount of water has been calculated at eighty-one gallons per head. Baloon Barracks (about two miles from Tera by winding road and about 400 feet lower than the Mall) commence on ledges, the highest 6065 feet elevation, the lowest, temporarily a hospital 5820, and consist of five red, slate-roofed, double-storeyed blocks of clay slate, or stone, in lime mortar, with boarded floors, and only dating from 1872. The twelve officers rent houses, else live in lodgings, mostly on Tera the centre hill. Provisions on the whole good, especially beef and mutton. Fruit and vegetables mostly come from Chumba, as hailstorms and caterpillars, likewise intermittent horticulture, interfere with gardens. Cauliflowers, milk, ducks, chickens, fish at times, difficult to obtain, else of poor quality. A cow to yield four seers costs twenty-five rupees, and bread of fair quality two annas a loaf. At the Bull's Head Hotel, a double-storeyed stone building, conveniently situated below and near the Mall, to hold ten visitors, the terms

are five rupees a day, and although the back walls are close to the hill side below the library and assembly rooms, sick officers and married people can be made comfortable. Families, in 1878, were very well satisfied with the table, cleanliness, and general management of the Strawberry Bank Hotel; the chief objection being that thin wooden partitions between the thirteen rooms conducted sound too readily. No very bad smells noticed at Dalhousie. Municipal rules are enforced respecting conservancy, the removal of litter and refuse, the protection of streams: the prevention of piggeries, of offensive trades, and nuisances generally, especially those associated with servants' houses and latrines. The slaughter-houses and the cemeteries were not forgotten; and to carry out financial arrangements, taxes on houses, horses, ponies, jampans: for permission to cut wood and grass in the forest: for every conceivable requirement, have been cunningly devised by local statesmen ever on the fret racking their brains to invent some new source of blackmail. No endemic diseases, though formerly malarious fevers and hill diarrhoea somewhat prevailed. Goitre seldom seen: enteric fever and skin affections rare; and for some years cholera lurking about the ravines has so far avoided Dalhousie, although in servants' quarters, from the limited choice of building sites, the occasional aggregation of horses, cows, and fowls beneath bedroom windows in wet weather must some day prove injurious. The natives, a very quiet respectable class, suffer with variola in April and May, occasionally with pneumonia or various haemorrhages, and sometimes families are buried in their houses by snow. No infanticide, a little poly-

gamy, and still less polyandry according to parole testimony. Rheumatism and dyspepsia at times prevalent. As regards temperature, climate, and seasons, nothing special to mention. Winters may be very severe, the temperature 10° below freezing point at night in January, and the roads have been practically impassable from snow for mules, or even laden coolies from December to March.

The following observations were recorded at Baloon by Dr Ramsay Stewart.

Year and month.	Temperature of air.							Rain.	
	Highest in month.	Lowest in month.	Range in month.	Mean of all highest.	Mean of all lowest.	Mean daily range.	Approximate mean for month.	No. of days it fell.	Amount collected.
1877									
January ...	52	31	21	44.54	38.45	6.09	41.49	11	13 $\frac{5}{10}$
February ...	49	29	20	40.00	34.89	5.11	37.44	9	19 $\frac{1}{10}$
March	57	38	19	51.80	43.87	7.73	47.83	15	9 $\frac{1}{10}$
April.....	69	43	26	59.30	50.03	9.27	54.66	16	7 $\frac{1}{10}$
May	83	48	35	70.06	59.36	10.70	64.71	14	7
June	89	57	32	78.06	67.83	10.23	72.94	16	5 $\frac{4}{10}$
July	83	61	22	76.38	67.51	8.87	71.94	18	5 $\frac{1}{10}$
August	80	58	22	76.38	67.61	8.77	71.99	11	4 $\frac{1}{10}$
September ..	73	55	18	70.70	63.40	7.30	69.05	8	7 $\frac{1}{10}$
October.....	72	49	23	61.12	53.22	7.90	57.17	20	3 $\frac{4}{10}$
November...	60	38	22	55.90	47.20	8.70	51.55	9	7 $\frac{1}{10}$
December ...	55	28	27	48.67	39.83	8.84	44.25	15	11 $\frac{1}{10}$
	68.50	44.58	23.92	61.07	52.76	8.31	56.91	162	100 $\frac{4}{10}$

DHARMSALA.—Other Sanitaria much higher are all situated on the lower ranges of the great Himalayan chain, which lies many miles farther in the interior. Here these lower ranges have all subsided into hills of comparatively low altitude, and Bhagshoo scarcely

6000 is situated on a spur behind which in direct distance only a few miles, abruptly rises an irregular stupendous stone wall, elevated in places up to 16,000 feet. Clouds brought up by the monsoon all rest here and precipitate themselves as showers on the southern aspect of the mountain on which the station is situated. Dharmasala unavoidably must ever be remarkable for excessive rain. In August, 1858, nearly 80 inches; in 1852, 152 inches; in 1854, 174. In 1878, nearly 133 inches from January to October, April 5, May 10, June half inch, July 32, August 69, September 6, October 2. In 1873—120 in 1874—159, in 1875—156, in 1876—140, and in 1877—96 inches. In other parts of the Himalaya the effect of the snowy mountain is softened by intermediate ranges and the mind prepared by a rising succession of hills for the tremendous heights which terminate the scene. But looking up from Kangra, the lower hills resemble ripples on the sea and the eye rests upon the sublime Titanic rocks, so sharply stretching up to the sky above the beautiful valleys at their base. The rugged hill sides are furrowed by precipitous water-courses. Forests of oak clothe their flank, and higher up give place to gloomy funereal pines. Above all are wastes of snow or pyramidal masses of granite, too perpendicular for anything to rest upon. Up at Dharmasala the mountain view includes the dark forest of Dhurmukote (2000 feet higher) backed by the rugged lofty rocks of gneiss or granite. Looking down from the mall or barracks, out-spread is a panorama of the Kangra valley which Lord Canning held to be the most beautiful district in India, with the exception of Kashmir, and which combines the advantages of

tropical with Alpine climate and vegetation. Notice the winding streams, the golden rice fields, the compact tea plantations, the bamboo clumps, the ruins of hill castles, once fiercely defended by gallant chieftains, and the grand towering old Kangra fort (14 miles off), now garrisoned by fifty Europeans who find it hot and feverish, though elevated 2494 feet. The valley, 108 miles long and 30 broad, will be found most pleasingly described in 'Barnes' Settlement Report,' now a very scarce work of reference. Dharmasala gaol, Ghoorkha lines and certain houses, are only elevated about 4000 feet on the hill slope. Other houses, the fairly level mall extending from the barracks to the hotel, and small bazar (the distance about a mile), would be elevated about 6000, whilst creeping up the well-wooded mountain of Dhurmukte are more cottages, the total number not fifty at a guess. The soil is made of alluvial deposit mixed with sand, boulders, and débris; the soil and subsoil consisting of red clay with projections of sandstone, and calcareous rock. Trees include oaks, pines, and rhododendra. The woods abound with wild flowers, and specially luxuriant and beautiful are silver ferns, which are replaced at Dalhousie by the maiden-hair, almost a weed in certain shady situations.

The maximum temperature in May at Dalhousie and Dharmasala thus contrast: 85°—100°, the minimum 44°—56°, the mean 67°—77°. The climate is most delightful when people are very comfortable in their own bungalows in the plains. The month of June, also, at Dharmasala is reckoned enjoyable. A very pretty place, and either from Jullundur or Dalhousie, or from Simla, the march will repay all trouble. Travelling by dhooly, leaving Dalhousie

at midday Dharmsala will be reached at midnight the day after. Under the name of Dharmsala is really included three different places, the cantonment of the Ghoorkas, the civil station called McLeodgunge, and the European cantonment of Bhagshoo. About 100 soldiers from Jullundur do a little work, a good deal of sleep, and breathing anything but blessings on the rain, find time hang most heavily in the two double-storied barracks. With ample fuel, warm clothing, and extra blankets the men remaining for the winter at Dalhousie derive incalculable benefit, which would probably also be the case at Bhagshoo. The water supply is obtained from a very few springs, but mostly from streams tortuously running rapidly along earth or limestone cuts from their homes in distant glaciers, and diverted wherever required. In some places, for instance, down towards the jail, a roaring torrent noticed. When hill diarrhoea necessitated inquiry, after going over the threadbare ideas of elevation, excessive cold, insufficient food or clothing, of course the water was blamed. That containing the least amount of organic matter appeared to produce the greatest amount of disease, which, too, may prevail from March to May, when the rainfall is least. Dr Whitwell, attributing bowel irritation to minute scales of silica and mica, recommended the simple expedient of boiling the water, with the most satisfactory results. Fevers in the gaol have also attracted attention as connected with situation on a plateau hot at day, cold by night, without protection from trees or hills, else with the usual conditions favorable to scorbutic dysentery, for instance, polluted water, which may also be

blamed in the cholera years of 1867—1875. Down amongst the Ghoorkas, and at the gaol, cholera mostly appears, but in 1875 it ran on up above from May to August, and out of ten Europeans attacked, seven died. Rainfall heavy, wind from the south, and diarrhoea very prevalent before and during the outbreak. The detachment of the 81st went into camp from August 15th to September 6th, to a spot three miles distant, and 1000 feet higher than the barracks. The practice of inoculation at Kangra has long attracted the notice of the vaccination department: and the sixty varieties of rice sown in June for harvest in October encourage malarial fevers. Gram fields attract lightning. All natives like radishes, but onions and carrots are eschewed by Hindoos, probably out of a spirit of contradiction to Mahomedans partial to these vegetables. Manure is greatly valued in the hills, and the traveller with animals, or the shepherd with his flock, is pressed to pitch his camp and stay. The little Ghoorkas are prone to phthisis or chest affections, and their wives, with a band around their foreheads, have to carry heavy weights on their backs. Goitre affecting baggage coolies is attributed to constitutional disease, poverty, intermarriage, snow and limestone water, together with cardiac irritability due to elevation and mountain climbing. The cooly load of thirty-two seers is reduced to twenty-four when crossing snowy paths. The various tribes and races are very interesting subjects for study. In secluded hills, where crops are scanty, and the soil demands severe labour, the handsome men are strong, but in fertile, irrigated tracts, or open valleys, the labourers who, in rice

fields, stand all day in water and mud, are stunted and sickly, disfigured by goitre, sulky, litigious, and given to drink. This latter failing interferes with the working of iron mines, and also crops up, as a curse of all nations, now and then in the tea plantations. The temperature of sulphur mines near streams may be 75° to 52° outside, and the hot, humid, suffocating fumes must be trying. Hill people, not so strong as those of the plains, are said to be open, candid, respectful, modest, truthful, faithful, industrious, attached to their homes, fond of law, fairs, music, and amusement; at the same time shy of strangers, very superstitious, and every house has charms to keep off witches. These houses are built of toon, sissoo, and certain firs, never of hur, behra, or peepul, nor of siris reserved for gods and rajahs. When our ancestors were savages and the Roman Empire was in its infancy, there was an organised government at Kangra which gallantly resisted many a fierce siege: for the wealth of the golden temple attracted every powerful robber. No corn or food at one period, and for four months the besieged lived on dry fodder. About fifty-two sieges altogether. Jehangeer, who had been at Dalhousie, read prayers, killed a cow, returned thanks for conquest, and ordered a mosque to be built. Under this drunken monarch we are "told that the song of Islam was sung anew with a loud voice, and the rose of the principles of religion bloomed and widely spread its fragrance." In 1806, when Kangra was plundered by the Ghoorkas, cultivation was stopped for three years, whilst grass grew in the town, and tigresses whelped in the streets. Besides district antimony, copper, and galena, the coal and good lig-

nite at Dhurmkote might be mentioned, also the pretty silver chains, charms, bracelets, manufactured and reasonably sold at Kangra. Up at Dharmasala, the imperial hills of solitary splendour and savage beauty, October 21st, 1878, seemed all in a blaze of crimson glory in the setting sun, after a clear, calm, sensuous, cloudless day, with the sky from azure blue against the gigantic peaks, shading to soft gold over the play of colour of cultivation down the valleys. Red and yellow cardinals and other birds of brilliant plumage then about. Nights were cold, and fires acceptable. From Triune, ascended by pony up Dhurmkote, then on foot up to 10,000 feet, a capital view of the lofty stone barriers was obtained, only separated by a deep gorge in which the russet, autumnal tints of trees contrasted with cascades, snow pouches, and the bare rocks. Temperature at Triune 59° at 2.30. Strawberry plants, everlasting flowers, and red velvet mosses, the prominent vegetation. From here can be traced the twenty-two miles of rough road up and down ravines of stones and boulders, to reach the undulating tea settlement of Palampore, ranging from 2891 to 5000 feet above sea level, and distant seventy-one miles from Pathankote, 110 from Jullundur; the rainfall 117 inches. About thirty-five planters in this little colony (where land has risen in value from two rupees an acre in 1870 to 100 in 1878) enjoy good health but for fevers, and do not find the place dull when business is brisk and prosperous.

In 1878 the amount of tea exported from India exceeding 38, will contrast with 11,000,000 pounds in 1869. Uncertain rains, hail, insects, caterpillars, beetles, the want of a bullock train along a good

road for market competition, likewise the necessity of providing a cheap palatable native article, figure amongst difficulties soon accumulating when apathetic managers relax supervision over manipulation. It may be sickness, trouble, intemperance, rash speculation, else domestic scandal, sometimes to account for shares depreciating. Properly planted the fragrant and beautiful tea bush is a hardy shrub, difficult to eradicate in raised valleys free from hot winds or on hill slopes elevated 3000 and 4000 feet, but at greater height small crops are expensive and comparatively flavourless. Snow at one time and moist heat between March and October considered advantageous. Praising Palampore, a healthy old resident recommended the cultivation of tobacco and more tea to replace rice. Very little goitre or sickness amongst natives; said to be intelligent, and under strict surveillance extremely industrious. The aristocratic, starving rajputs, who, disdaining the plough formerly, had to live on berries and game, else by hawking or shooting wild pig, are now glad enough to earn five rupees a month by working with spades in tea plantations, without discredit to pride, pedigree, or the prejudices of select society.

Dharmasala but for excessive rain would be an attractive sanitarium. Up at Triune (where ladies encamping will find the nights bitterly cold) certain words of Ruskin might recur to recollection, for instance, about "mosses to whom is entrusted the weaving of the dark eternal tapestry of the hills;" "about the silver lichen spots resting star-like on the stone, and the gathering orange stain upon the edge of neighbouring peaks." The moment of the sun's farewell may recall the sad solemnity of the most

impressive funeral. The cold grey rocks become rose pink, and later the moon, a dazzling, glittering disk or burnished shield of purest silver set in the deep sapphire blue firmament, spreads out a soft divine effulgence of violet or light lavender over oak- and fir-clad hills; over, also, the Kangra Valley, as noticed in November, 1878, at an hour when the entire absence of sound intensified the solitary grandeur, the heavenly beauty of the scene.

The Ghoorkas (just as friendly now with soldiers in Afghanistan as at the siege of Delhi) are terrible sportsmen, and the wholesale slaughter of game by hired experts shooting for the pot, periodically is exposed in the newspapers. In the little museum are beautiful specimens of the silver pheasant (kallej), the blue (monal), the brown (cheer), the mottled (koklas), and the argus (loongee), besides partridges and woodcock, the snow birds, and animals of high altitudes. The pheasants are recognised by their notes, either cooing, whistling, goat-bleating, or crying out kokla-kokla. The prim females, soberly, demurely attired in Quaker grey, occasionally, for private reasons of their own, assume the golden copper metallic iridescence, the gay plumage, the scream, the strut and swagger, the pugnacious habits, of their lords. The moths, butterflies, and beetles (many not yet classified in the British Museum) really ought to tempt an enthusiastic entomologist just to step up to Dharmesala.

MURREE.—From information received, the building arrangements and the comparative proximity to Cashmere may account for sickness, whilst the annoyance caused by red mud in wet weather, spoiling clothes, must be extreme. Mr Val Prinsep leaving

Rawul Pindee, April 23rd, 1877, in a hill cart, did on the flat a mile in four minutes, and the whole distance, thirty-eight miles, in four and a half hours. "Murree is reached; a long line of houses at the top of a hill. To the north and north-west, an endless sea of plain, then the foot hills advance like tiny waves, and growing larger pass on till they seem to beat against the Pin Punjal, which rises 10,000 feet. It was very cold, and a roaring fire acceptable. At Pindee so hot, quite a labour to move about, and at Murree you are shivering at 4 p.m." Srinagar is, by the new route, 160 miles from Murree, the last forty by boat; about eleven marches. In the guide book by Dr Ince many minutiae are detailed, such as the rent of ninety houses, whether furnished or not, the measurements of the ante-room down to the pantry and bath rooms, all taken by the enterprising author probably "in the intervals of business." Elevations culminate in Kashmir Point 7507, on the north-eastern side above Church Point, Castle Point, Terrace Hill, Fir Hill 7467. Whilst along the south-western half there is Oxford Hill 6500, Pindee Point 7266, and Barrack Hill 7357. The ridge, four miles long, is composed of purple ferruginous clay and hard sandstone, and in some directions of clear blue limestone. North and west slopes clothed with trees such as oak, pine, bird cherry, horse-chestnut, poplar, willow, elm, maple, and sycamore. East and south slopes comparatively bare, else dotted about with small shrubs. Rhododendra rare. Potatoes and other vegetables easily grown. Food supplies partially obtained from Kashmir. Ice brought in by coolies up to the middle of June, from shaded gorges, sometimes

seventeen miles distant. Military dépôt population reckoned at 865, and from April to October 1600 Europeans are scattered about in 165 houses in certain directions, over-built, over-crowded, with defective sanitation, annually remedied whenever or wherever practicable. In 434 houses, in bazar, or near private cottages, hotels, or club live 7820 natives, accused periodically of introducing cholera from Kashmir, for instance, in baggage to Powell's hotel in 1876, when two of the landlord's daughters died. Many houses built of calcareous sandstone are roofed with shingle. The bazar is 100 feet below the hill crest on south side. The station is admirably drained by natural channels on the steep slopes of the hill, and has numerous springs of water of hard quality, and variable quantity, according to seasons.

The principal springs for drinking and cooking requirements are efficiently protected. The average rainfall for the summer months, according to Bellew, is estimated at thirty-five inches. De Rinzi gives the average annual fall as fifty, but during the summer it may range from twenty-two to fifty-one, commencing in July to end in September. From five to six feet of snow may fall in January and February. During the winter of 1876 there noted seventeen feet, and the melting afterwards greatly damaged the Cashmere road. May and June are hot months. Mean temperature from May to October 65°. Dr. Ince, in 1870, states that hill diarrhœa is mild, that new arrivals may be chilled into biliousness or fever, "usually soon removed by a timely appeal to the medical officer." Measles, hooping-cough, chicken-pock, scarlatina, croup, convulsions, fever,

and bronchitis, figure amongst infantile diseases ; and in the nice little guide book he advises mothers to take children indoors in hot months at 7 a.m., and before sunset in damp weather, when flannel clothing is specially required. Cholera has been noted in 1858, 1867, 1872, 1876, 1879, generally in connection with close muggy weather and excessive rain, also with winds blowing from infected localities. In 1872, on the day after arrival of a detachment at a camping ground on an eminence a mile beyond Topah, the disease reappeared, when nine cases died out of ten affected. At Netley, Surgeon Exham tells me of that fearful time when at night, howling wind, drenching rain, and lanterns failing to illuminate the miserable black darkness in the wretched soaking tents, complicated his efforts amongst those recently attacked and the dying. One man dug a grave, little thinking in a few hours it would be his own. The spots selected were Kotli and Chamianah, three and five miles from Murree respectively on the Kashmir road. In 1876 the disease again was of extraordinary malignity in spite of improvements. Leaky and overcrowded barracks had been repaired and enlarged, pools and puddles had been drained or filled up, offal and filth removed far away, the springs protected, and the general conservancy arrangements greatly amended, and yet the epidemic was of a more virulent and fatal character than any of its predecessors. In ten July days twenty-four seizures and twenty-two deaths occurred amongst Europeans. In camp on Topah Hill the melancholy miserable history of 1872 somewhat repeated itself. *Vide 'Report' for 1876 by Bellew.* The following table refers to that terrible year.

	Mean maximum.	Minimum.	Daily range.	Mean temperature.	Rainfall.
May	85	58	27	72	3
June	89	62	26	75	2
July	77	61	15	69	19
August	74	61	13	67	18
September	72	57	15	65	3

Murree is a very gay and festive place, and the healthy Gullies are greatly liked. Here, as at Sanawar, the Lawrence Asylum for Children shows favorable results. In 1877 out of eighty-eight boys and sixty-six girls, the ages ranging from five to twenty (sixty-five under ten, and eighty-one under fifteen), no deaths occurred. Nine boys in April and May, and ten girls in May, June, July, treated for mumps, and with the exception of four entries for conjunctivitis almost a clean bill of health. In 1876 no cholera, one fatal case of dysentery in June. In April and May, 1875, measles attacked twenty-three girls, one death. In 1874, with fevers from March to June, bronchitis in April and May, no deaths. From 1869 to 1873 but one death, as compared with eleven at Sanawar, between Kussowlee and Simla. For fifteen years only one admission from phthisis at Sanawar, and which terminated favorably. The continued absence of this disease from Murree and Sanawar, considering how weak and sickly the big boys and girls formerly were, is extremely remarkable. At Sanawar enteric fever may start from well-known causes. Ague, dysentery, diarrhea, measles, hooping-cough, bronchitis, thermal fevers, and chilblains, besides cutaneous disorders, include other possible ailments. Murree is extremely

liked by pleasure-seekers, who crowded the place in 1879 until scared by cholera, when they fled to Dalhousie. The dhooley journey from Rawul Pindee to Murree only requires twelve hours. On an irregular, well-wooded hill above Murree, five miles distant, about 100 married families were comfortably tented in 1878, and enjoyed excellent health. Water was brought up by mules. An old soldier (often a difficult class to please) spoke very highly of the encampment. From his appearance, and also his documents, a faint suspicion arose that something else besides water found its way there.

NYNA TAL.—Situated in the district of Kumaon, north of Bareilly, twenty-two miles south-west of Almorah, 140 from Meerut, sixteen miles from Kaladoonghy at the foot of the hills, and fifty more miles from there to the rail at Moradabad. Another route by Bareilly, as noticed in Lucknow section. The former journey from Moradabad involves crossing two rivers, a drive through a Terai of rank odour at night to reach the dak bungalow; from whence next morning by pony, dandi, jampan, or dhooley along a fair road, ascending to a good height, then a somewhat tedious gradual drop to reach the margin of the lake. Either from the Terai, or an injudicious swim soon after arrival from hot muggy Meerut, it was my fate to start a severe and protracted illness on returning to the plains, after a few days' leave at so-called naughty Nyna Tal. At the concave end of a horse-shoe, about the centre, place church, library, club, hotel, bazar, and a few houses almost encircling a beautiful lake elevated 6350 feet; the surrounding hills rising from 7461 to 8568, the average habitable altitude 6800. These hills are rocks of igneous

origin, combined with clay-slate limestone and shale, with a light friable surface soil. Black limestone cliffs on one side with argillaceous schists on the other. Up this valley, in the heart of the mountains, cottages are scattered about, but the hotels and places of resort are located on the flat near the margin of the water most conveniently for bathing, boating, promenading, or invalid transport without jolting, bumping, or shaking up and down inclines.

Amongst trees may be noticed ilex, pine, rhododendron, cypress, and ash on slopes. The potatoes are celebrated. Orchids, anemones, violets, and potentillas are shaded under evergreen andromedas. Lake circumference two miles, extreme depth ninety-three feet, least depth on a ridge running through the centre twenty feet, greatest length 4702, width ranging from 792 to 1518, superficial area 120 acres; about 21,000,000 cubic feet of water, contributed by springs and surface drainage from surrounding mountains. Running rapidly, the pellucid stream sometimes becomes red, when to kill time, scribblers complain in the 'Pioneer,' and ask for the Sanitary Commissioner, who is or was a magnificent swimmer. Reports blaming volcanic action, and confessing to sulphate of magnesia and lime, likewise to sulphuretted hydrogen, as results of analyses, showed that the change of beautiful blue colour temporarily into dusty brown, depended not on filth but on infusoria, perfectly visible to the naked eye, chiefly on the surface and ten to twenty feet below it. Sewage flowing down the mountain sides becomes arrested and partially oxidised by trees, shrubs, plants, and mosses. From April to

October, taking the population as 5000 with about 1000 animals, the stream is too rapid, and the volume of water in the lake too great to allow of sufficient contamination to prove detrimental to health. Excellent fish brought for breakfast at the Victoria or Mayo Hotel weighing ten pounds.

Conducted through iron pipes into tanks and filters at the barracks (a mile from the east end overlooking lake outlet), the drinking water is considered good and innocuous. In its course to the plains the torrent feeds mountain streams. Lake temperature 64° in August. No rice, indigo, or flax close to cantonments, and jungle is cropped in the many ravines. Rainfall from 68 to 144, often 100 inches. It is said that 219 days in the year are fine, 68 cloudy, 76 made up of rain varied by hail or snow. From the middle of September to the end of May the climate bracing, exhilarating, invigorating; June cloudy, rainy, windy; July hot, damp, rainy; August misty, damp; September at first extremely relaxing. The winter may be a period of most glorious weather. Very little hill diarrhoea, cholera, or enteric, no variola unless introduced. During rainy or foggy months, with chilly nights, infantile bronchitis, hooping-cough, influenza, diphtheria, croup, must be guarded against. Erysipelas also, and as sores or ulcers then heal slowly, blisters must be cautiously applied. Nyna Tal reputed to be bad for liver cases. Visitors must be careful about clothing. Shade temperature (Dr. Whitla) maximum and minimum 1878, May 78°—48°, June 69°—59°, July 78°—61°, August 76°—62°. People need never be dull. Quiet enough for those contented to walk round the syren lake,

to climb up the hills, or be satisfied with a most creditable library.

RANIKHET.—Twenty-two miles from Nyna Tal, is the somewhat dull, healthy, little settlement of Almorah, elevated 5400 feet. Twenty miles northwest of this will be Ranikhet, a station for one regiment located on a hill less steep than usual; the barracks double, but mostly single-storeyed, elevated from 6000 to 6200. A thousand feet higher, and distant three miles by bridle path, six by cart road, another fine hill, a forest clearing, called Chonbattie, accommodates half a battalion. Water supply without reservoirs for rain storage may be scanty, yet on one calculation the, minimum amount, excluding small springs, would allow each man fifteen gallons in a population of 1800. Fogs may annoy, but the climate, the scenery, reported fine, and at first the deer shooting was something fabulous. Broad roads with a gradient of 3 in 100, and suitable for bullocks, camels, or mules, wind for miles around the mountains. Formation mostly mica slate, with traces of sandstone; no lime; real clay slate at Chiteli, twenty miles off. Heat, glare, and dust, perhaps trying until the rains, which are moderate in a station so favorably situated in land. Evergreen oaks, rhododendra, chir pines 100 feet high and of great girth, here flourish. Supplies brought from a distance. The glowing reports on Ranikhet tempted Lord Mayo to think of abandoning Simla, as some level ground could be expanded in former locality. When tents were originally pitched, indeed for years after, new arrivals scarcely without exception suffered grievously with rheumatism, white diarrhœa, and debilitating dyspepsia, apt to ferret out and aggravate

any constitutional infirmity ; the cause attributed to fir trees affecting drinking water, to chills, else to irritation induced by minute scales of mica, as at Dharmsala.

In McClelland's 'Medical Topography of Bengal,' those curious about goître will read all about the granite, gneiss, horn blonde, limestone, mica, clay-slate, dolomite, and sandstones of Kemaon ; about copper miners afflicted with bronchocele, enormous heads, weakly bodies and brains ; and the deleterious influence of limestone. But Mr Batten, in old district reports, shows that goître flourishes with lamentable vigour on other soils clear of calcareous rocks. In the latter book is incorporated a paper by Dr Renny on Mahamarree, too important to escape the poaching net of compilation, particularly as this disease, identical with Egyptian plague, virulently recurred in its favourite haunts in 1876, and after investigation was put down to the old, old story of dirt ; or else arising from the use of mandua (*Eleucine cora cana*), a decaying grain at the time generating a peculiar fungus. Rats, mice, serpents, and even jackals died rapidly, so Dr Watson reasoned that as rats feed on grain, serpents on rats, jackals on dead human beings or animals, the explanation after the fashion of a certain house that Jack built, was traceable to this grain. On the other hand, Dr Planck noticed that frightened people, flying from plague-stricken villages, still eat the same mandua and live. Pilgrims who subsisted on wheat, barley, rice, and dal, did not suffer, and their clothing of dirty cotton, instead of wool or hemp, according to tradition, conferred immunity. Villages were commonly buried in dense crops of gigantic hemp, and

the small dirty stuffy hovels enveloped with cucumbers, water melons, pumpkins, scadent vegetables, or creepers. The dung heap of course contiguous. Malarial fevers, rheumatism, variola, goitre, affections of the lungs bowels and spleen, besides cutaneous disorders, ascribed to the use of spring water, annually may trouble. Beyond fennel seed, black pepper, chiretta, and musk, more faith is placed in charms, incantations, and magnetism than in medicines. Cauterizing by the application of lighted balls of tow, and firing by means of an iron, figure amongst local remedies. With a razor and a pair of forceps the humble lithotomist of low caste will operate on subjects of all ages with sufficient success to establish a reputation. The usual credulity about the evil eye, demoniac possession, sorcery, and witchcraft powerfully rule the minds of the poor natives about Almorah, and they believe most implicitly in spirits and fairies. Of the numerous ghost tribe those of old bachelors are seen only in wild and solitary places, as their society is shunned by all other members of the craft; whether innocent infants, unfortunate married persons who have died violent deaths, or vicious old goblins generally of extremely indifferent reputation. The numerous classes of demons obnoxious to men, women, children, and cattle are blamed for every ailment. Mahamurree commenced at elevations of 10,300 feet, sometimes lower amid the deodars. With increase of elevation red rhododendra, oaks, and deodars are replaced by the king pine, juniper, and white rhododendra, while above all is found the birch on the very verge of perpetual snow. Ground cypress, red and white dog roses, sweet briar, iris and anemone

in certain directions abundant. The pasture on some ranges adjoining the Himalaya has a wonderful reputation for rapid growth, and nutritious qualities after the melting of the winter snows in March. In a few days emaciated half-starved sheep begin to put on condition. Sheep and goats suffer either with rot, mange, variola, else foot-and-mouth disease, in wet weather. In his poor, wretched, dirty, little house never cleansed or purified even after epidemics, the unfortunate shepherd keeps his flock. Poverty, privation, filth, and bad food, the necessity of crowding together for mutual warmth and shelter against the inclemency of the weather being the hard lot of these miserable peasants from the cradle to the grave. No light appears thrown on the actual origin of Pali plague to explain why so virulently in certain years, at such high altitudes, this Black Death should so malignantly wreak its vengeance, not extending to the plains below, or as yet, however contagious or infectious, to the few Europeans just within range. Briefly the symptoms and most prominent characteristics include mild fever, headache, glandular swellings, intense thirst, a craving for bitter things, no eruption, no chest or bowel complications, very little constitutional disturbance, whilst life insidiously ebbs away in twenty-four to thirty-six hours. Friends and relations flee to the forest or distant peaks, leaving the sick to their solitary fate. In such a climate decomposition is slow, and the chief scavengers are carnivorous bears. Left to themselves natives would never burn the roof, at slight expense whitewash or cleanse the hut; but after a while everything is forgotten, the villages are inhabited by newcomers, who follow the

fashions of their forefathers. As to treatment Dr Watson fancies common salt or hyposulphite of soda might be tried. Natives, when not in extreme hurry to rush away, rub their patients with oil of sandalwood and ashes. Dr Renny in 1850, "seeing the almost total failure of present treatment, attention was turned to the most practicable means of prevention, and a *letter on the subject was written to the assistant commissioner of Ghurwal.*"

DAEJEELING.—Only 371 miles from Calcutta, 30 from foot of hills, by road 15 in straight line, and 60 from the snowy range. A train leaving Sealdah at 1 p.m. reaches Damookdea at 5.30, next cross Ganges by steam ferry, train on 196 miles, and at 9 a.m. reach Silliguri on the verge of the Terai, and within 12 miles of the base of the mountains. From here by Tonga dak to Kurseong (4600 feet), Sonada, and Darjeeling. Ponies, a covered dog cart, doolies, palkis, procurable. Travellers by Mail Tonga, can only take eleven seers of luggage. Dak bungalows at Siligoree, Kurseong 20, and Sonadah 10 miles from Darjeeling. Leaving Siligoree at 8.30 a.m. a palki should reach Kurseong at 7 p.m., there to rest, and next morning proceed to complete the journey, which, until recently (1878), would take say from Monday night to Thursday afternoon. The belt of the Terai is sixteen miles across a country partially cleared by tea planters, in the rains a horrid expedition, and, except in the very hot season, the "miasma of the wet land," which killed Lady Canning, still continues so pestiferous that to avoid infection, it is advisable to rush over the ground by day after a good breakfast and a dose of quinine. Some tribes are insen-

sible to malaria so long as they stop at home, and tea planters have escaped until they ascended to the "Holy or Bright spot." The Terai, really below the level of the plains, has a clayey bottom, down to which innumerable rills percolate through gravel and sand of layers above. A rich stratum of vegetable mould in places favours particularly the growth of sal, the most useful of trees, and ascending from valleys up to 3000 feet. Bright yellow and purple orchids, scented magnolia and magnificent bamboos seen after leaving Siligoree. The wide broad Tongha road skirting the flank of the mountains is said to be a triumph of engineering skill. Those curious about Darjeeling are referred to 'Hooker's Himalayan Journal,' Hunter's 'Bengal Statistics,' the writings of Norman Chevers, Collins, Withecombe, and Domenichetti, in 'Indian Medical Annals,' the 'A. M. D. Report,' for 1862, 'The Abode of Snow,' by Wilson, the 'Indian Alps, by a Lady Pioneer' (a most delightful book and beautifully illustrated), to 'Up in the Clouds,' by Mary H. Avery, (a very interesting little volume), also to stray papers in the 'Indian Medical Gazette,' by Duke and others, whose names unfortunately do not appear in the moth- and white-ant-eaten note books brought back from India. Besides difficulty of access and the Terai objection, houses at Darjeeling were twenty-five, and servants seventy-five per cent. dearer than other stations. The rainfall, of 11 feet possibly, is another serious drawback: to think of 4 inches in April, 6 in May, 27 in June, 28 in July, 25 in August, 17 in September, and 7 in October. Cloud proportion 6 for the year; 5 from January to April, 6 in May, 8 from June to

September, 4 on to December. Mean humidity 80° temporarily down to 68° in March. With immunity from violent atmospheric phenomena clouds on the verge of saturation predominate. About 9 a.m. start fogs, when masses of rolling mist fill up the valleys, so that by noon every object is in cloud. Spring time, resembling that of England, lasts from March to May. From May to October nothing but rain, which, however, usually does not produce many coughs, colds, or sore throats of any severity. From October to February the days are bright, sunny, and cheerful, the nights cold, frosty, and clear, an equable climate, a mild winter, with half the amount of snow of Simla.

Mean maximum, minimum, mean daily temperature —January 62°, 30°, 43°, June 78°, 55°, 63°, September 76°, 52°, 61°. From January to May the winds are south-west, west, and east. June to September east and south-east. October to December east, south-west, and west. The amount of mist and cloud said to be diminishing with forest clearing and cultivation. At 7000 feet many English vegetables are in perfection. Peas and cauliflowers blossom beautifully, and, in his own garden, Dr Collins plucked ripe strawberries in December and January. Somehow in later years potatoes are failing in quality. The geological condition is said to be gneiss, with granite cropping out. The soil is stiff red or yellow clay, a mixture of rock *débris* with vegetable humus. In certain directions sandstone, quartzose, shales, slates, beds of anthracite coal, mica schists, garnet, copper, iron, manganese, and lime. Drinking-water, mostly free of lime, bears a good character for purity unless drawn from suspicious sources when springs fail. Iron and sulphur, iodine and

bromine found in ravine streams, and in others an objectionable species of agaricus, or the usual contaminations due to birds, rotting leaves, or dirty surroundings. A mineral spring, in a slate cleft near a copper mine, formerly had some reputation, and another three miles east of the station is said to be beneficial in rheumatic or cutaneous diseases. Besides drinking the water, natives make with plantain stems a bath, raised in temperature by adding heated stones. The non-Asiatic population, according to Hunter's statistics of a recent date, amounted to 420, divided into 207 English, ninety-seven Irish, forty-two Scotch, nineteen French, forty-three German, five Prussian, six Italian. In the tea gardens (113 in 1874) were employed nearly 20,000 labourers on 19,000 acres of land. The report of 1879 scarcely satisfactory to the planters. Ipecacuanha is cultivated on lower spurs with fair prospect of success.

In the 'Manual of Cinchona Cultivation,' by Dr. George King, there are meteorological observations taken on slopes ranging in altitude from 2556 to 5000 feet, and used as shrubberies or plantations. Thus, the mean at 2556 feet at Rungbee would be 71° , contrasting with 64° at 3332, with 59° at 4410, and with 57° at 5000. Two barks may be calculated on, the yellow and the red—the Calisaya and the Succirubra, particularly the latter, which is hardier, more easily propagated, and has a much wider range of growth. The red, though partial to a range between 1500 to 2000, does not object to 800 or 5000, the yellow from 1500 to 2000. The officinal and the grey varieties did not thrive. Such shrubs generally like cleared forest or grass land, rich soil, open subsoil, and plenty of exposure to

light and air on slopes, without great alternations of temperature between summer and winter or between day and night. Sharp winds, frost, and the white ants do damage. Sometimes the roots become cancerous, or the stems and branches may be blighted by escharotic patches after excessive damp. The plants will not flourish under the shade of other trees, and, caste fashion, no different varieties grow together. Seeds ripen during the dry season that follows the rains, the red immediately after, the yellow in January. An ounce of seed should produce 20,000 plants. In Sikkim manure is beneficial. High temperature favours the formation of cinchonidine, and diminishes that of quinine. Alkaloids in red bark are not permanent in either nature or quality. Rising on from September, falling slightly in February and March, the special remedial qualities are most valuable in May. The bark of diseased trees contains little alkaloid, that of dead trees none whatever. Red cinchona rich in total alkaloids, poor in quinine, which with difficulty is extracted. Taken in large bulk this bark yields a mixed alkaloid, composed, say 100 parts : of crystallisable quinine 15.5, amorphous 17, cinchonine 33.5, cinchonidine 29, colouring matter 5.

The Darjeeling mixed cinchona alkaloids are considered excellent substitutes for quinine, and the hope is that with a febrifuge at a rupee (or half, they say, a rupee even) an ounce, malarial fevers will be robbed of thousands of annual victims. A few years ago Madras reports on rather meagre evidence were unfavorable. In 1878 more extensive trials in Calcutta and Howrah proved that the Rungbee plantations, numbering millions of trees, only require

time and sufficient practical knowledge to become fully appreciated. In America, Munich, and certain Italian hospitals, quinidine (or conchinine) in 1879 satisfied physicians. One calculation endeavours to show that 130,000 ounces of Sikkim product is nearly equal in money value and therapeutic efficiency to a similar amount of quinine, which at nine shillings the ounce would cost £58,500 in London. For a list of trees, shrubs, and large climbers found in Darjeeling district, *vide* a small book by J. S. Gamble. Most prominent mention should be made of sal, magnolia, oak, chestnut, toon, india rubber, certain firs, crimson-coloured, pink- lilac- mauve- purple-red- yellow- and cream-white- rhododendra; the tree ferns and the wondrous orchids requiring a volume of description. Golden ferns have stems three feet high with fronds in proportion. Banks are studded with stag moss and yellow calceolarias, also at some elevations, the "Lady Pioneer" found lilies of the valley and forget-me-nots. There are twenty miles of road within the station partly metalled. Of the forty-eight miles from Siliguri, eight of the first miles over the Terai are metalled. The nearest peak in a straight line from Darjeeling is twenty miles off. A day's journey from the station enables the visitor, when weather permits, to see Mount Everest, 29,002 feet, and from Darjeeling itself Kanchinjanga, in Sikkim, the second highest peak in the world (28,150), is visible. A jagged line of snow connects these monarchs of mountains.

From the Cutcherry Hill more than twelve pinnacles can be counted which rise above 20,000, and none below 15,000. Indescribably magnificent is an easy way of getting out of the difficulty of attempt-

ing to word-paint the scenery. The letterpress and pictures by the "Lady Pioneer," however, have so charmed the most exacting of reviewers that they are fairly driven to share her enthusiasm, and to envy the deep happiness of a sojourn in this enchanted land, sentinelled by the everlasting mountains. Bishop Cotton learned to look upon them as personal friends, and writing about Kanchinjanga—second of earthly mountains—he considered the view enjoyed from the Senchal parade ground something to be treasured as one of the most noteworthy moments of his life. The barracks formerly were built on a high spot called "the friendly umbrella," protecting Darjeeling from the south-east, and encountering the first burst of wind and rain. On the crest of a hill (7000) stand the houses of the English residents, and 500 feet higher, in a somewhat bleak exposed position, on the narrow ridge of a mountain, oft enveloped in swooping mists, the hospital and convalescent dépôt are situated. A boarding house is mentioned, but no hotel in 1878, so visitors were advised to take their ease at the "Clarendon" at Kurseong, unless house arrangements had previously been negotiated. Bazar food supplies on the whole appear expensive. Visitors are also recommended to bring up thick-soled boots, warm ulsters, patent waterproofs, rough clothes, strong riding habits, and all their umbrellas.

Near the station the slopes are becoming more bare, as tea planters chop down the trees. Game is not abundant. Formerly in the Terai and at different altitudes, the tiger, rhinoceros, wild pig, elephant, bear, leopard, and several varieties of deer abounded. Lizards, scorpions, centipedes, fleas, flies,

and blood-thirsty insects, now are by no means extinct. The bazar in a hollow at one time complained of, and the constant rain must interfere with dry earth conservancy. Cases of asthma, cardiac, cerebral, or decided hepatic disease do badly. Croup one year proved severe, except for children one or other of whose parents had been born in India. Coughs and colds do not divert into bronchitis or pneumonia, but malignant sore throats, were noted in June and July 1855, and in 1865 fevers and dysentery were followed by mild cholera in 1866, said to be introduced. As a rule, drinking water is pure and good enough for photographic purposes. Scarcely any dysentery or hill diarrhoea, and rheumatism seldom troubles. Instances of puerperal mania ran on to recovery. No apoplexy or sunstroke, no heat, no glare, no dust, and cases of ophthalmia do well. In 1851, variola, ever prevalent amongst dirty natives, extended to others. Very little enteric so far. Remittent and intermittent fevers the principal ailments, oft brought up from the Terai or the plains, soon to be directed towards recovery. One year Jhansi fever increased statistics. A study of figures, calculations, and limited records, leads to conclusions that Darjeeling *must* be a grand place for children in spite of rain, mist, and fog. During a number of years, *no* cholera, *no* measles, *no* dysentery, diarrhoea, bronchitis, or head affections, *no* variola, dengue, or scarlet fever; and dentition gave no trouble. Thus the good character continues, but when the place becomes better known, crowded, and dirty, statistics will not be so agreeable a study as at present. Weakly children soon pick up. The St Paul's endowed school, in a good situation under

sanitary supervision, accommodates 120 scholars at 10 rupees a month for daily pupils, and 25 for boarders. The Diocesan school for girls (on much the same terms), and the Catholic school for young ladies, besides several other educational establishments, are reported to be very healthy so far. Natives suffer with variola, fevers, and mild rheumatism. Goître, it is said, seldom severely afflicts Lepchas, who, different from the Bhoooteas, do not use forehead bandages to support weights. In the district, cholera accounted for 150 deaths in 1875, specially virulent in June and July, with a total rainfall of fifty-nine inches, the winds east and south-east, then south-east and east. In August, with a rainfall of thirty-one inches, a mean temperature of 62°, the same as June, and the wind in the same direction, only seven deaths. In 1876 cholera ran on with fluctuating numbers from January 23, March 199, April 122, to June 910, July 236, August 17. September and October none. November one. December four. In this fatal month of June the winds were westerly, mean temperature 62°, mean humidity 95°, rainfall twenty-nine inches. In the clear month of September the winds were south-west and east. Kurseong, elevated 4500, suffered the most. In June most of the gardens were attacked, and the panic-stricken coolies fled to the forests. Of the 910 deaths 790 occurred in hill tracts, 120 in the Terai. Dr Coates alludes to natives suffering with worms, ascribed to drinking water drawn from foul ravines during seasons of drought. The usual insanitary story. Europeans did not suffer, for tea planters had good accommodation, suitable food, filtered drinking water, warm clothing, and paid attention to

the general laws of sanitation. At other times unfiltered water is considered a cause of Terai fever. By natives death, instead of being accepted with callous, stoical indifference, is dreaded with extreme terror and horror of the future.

Each acre of land reclaimed by planters will tend to ultimate eradication of Terai fever. In April and July, 1871, two young men recovered after enteric, complicated in one instance with pneumonia, and most distinctly traceable to wanton, reckless indifference about drinking water. As Darjeeling increases in European population the idea is to tap springs at Senchal and elsewhere, as even now there is a difficulty, especially in the amount of pure supply for natives. Hooping-cough mildly occurs periodically. Persons from the plains in October or November may develop fever directly on arrival at Kurseong, a pretty plateau (to a certain extent), and once recommended as a military station with parade ground, yet open (judging by reports) to many objections similar to those at Subathoo. In a report for 1877 water analysis still continues satisfactory. Night-soil is buried in the Municipal Garden, and also on the uncultivated hill side, but the space is much too small; and Dr Lethbridge was surprised to find so little demand for manure in the tea gardens. This Municipal Garden for the first time paid expenses and returned a profit. The district population of 20,000 consists of Lepchas, Bhooteas, Limboos, and Ghoorkas, mostly (especially the former) quiet, inoffensive, mild, dirty, gentle, simple-minded, indolent people, not much given to lying or thieving, yet passionately fond of gambling. The merry little Ghoorkas, great sportsmen, make capital soldiers.

Among least civilised tribes or races it is customary in seasons of sickness or trouble to seek for omens in sacrificial entrails of fowls, goats, pigs, or oxen, as in the Khasia Hills in 1878, described by Dr O'Brien. There eggs are broken on a board, and according to the manner in which the yolk, white, and shell are blended comes the answer Yes or No from the devil. For instance, are the people to be vaccinated ? Crack goes an egg, and if the civil surgeon plays his cards well with the augur or soothsayer, the answer will vitally affect the extent and virulence of variola. On one occasion a sick woman, expecting recovery after consulting the oracle, daily grew worse, either from malpraxis or the influence of the evil eye. Woe to the prophet ! The learned gentleman was asked to a feast consisting of rice and pork, a cut from the village pig, and as much arrack as he could drink. Accepting with much pleasure the kind invitation, he went to the family dinner party and never returned.

CHAPTER VI

MINERAL WATERS

IN 1853 Dr Macpherson suggested an investigation of mineral waters so much employed by natives, and in an early volume of the 'Indian Annals' will be found his paper. Years ago, also, Dr Murray endeavoured to utilise springs below Landour, but the undertaking collapsed in 1846, apparently never to revive until speculating capitalists, besides developing mineral resources, may start good roads, houses, hotels, all essentials such as music, dancing, cards and billiards, every amusement to attract vale-tudinarians to places conveniently near wells, streams, or fountains. Even now making up parties people at Simla might take out tents to encamp for a while at Nagkanda (fifty-six miles off) to walk, ride, to enjoy glorious scenery, change of air (8676 feet), and at the same time to drink the waters. The taste, perhaps, may recall Sam Weller's description of Bath chalybeates, recently praised by Drs Falconer, Brabazon, and Spender. Spread over the volumes of Ziemssen are recommendations of certain spas for gout, rheumatism, neuralgia, chronic gastritis, dyspepsia, constipation, bronchial, laryngeal, and renal affections, together with types or phases of debility. Anglo-Indians, the returned tropical, the soldier or civilian at home on leave, times and times again advised

to try Carlsbad, Friedrichshall, Pullna, Hunyadi János, or any other waters, will find every requisite information in the excellent books of Braun, Sutro, and Madden. At Carlsbad the warmer spring contains the least amount of carbonic acid. Most analyses point to sulphate of soda and potash, chloride of sodium, carbonate of lime, magnesia, and protoxide of iron, alumina, silica. Recommended for enlargements, passive congestion or torpidity of the liver, for jaundice, hypochondriasis, gout, and dyspepsia, also to reduce the fat of sedentary *bons vivants*, these waters are contra-indicated in scurvy, dropsy, phthisis, chlorosis, actual digestive atony, lithiasis, and also in organic diseases of the heart. The air, the diet, the exercise, make all the difference, and, except during snow periods, the life at a Himalayan spa could be made to resemble that of Europe, and all the crushing expenses of a short, unsatisfactory home trip avoided. Men drawing pay in good Indian appointments very naturally are loath to resign their loaves and fishes, only too eagerly snapped up. People also are awaking to the reality that, excepting to very strong individuals, these hurried home visits are injurious, unsettling, distressing, very detrimental to economical projects, and, as regards effect on the body, about as permanent as the dye on the clothes of the shabby man in fiction described. The natural evaporation of Sprudel water yielding Carlsbad salts (of sulphate of soda, carbonate of soda, with lithia), well known as mildly purgative without inducing intestinal irritation, doubtless can be closely imitated in the Punjab. So with other mineral waters of entirely different properties. Marienbad, chemically consist-

ing of sulphate of soda, chloride of sodium, carbonates of soda, lime, magnesia, iron, manganese, lithia, besides silica and carbonic acid, acts directly upon the liver by notable increase of secretion, and is applicable where Carlsbad would be injurious.

The long celebrated Pullna contains sulphate of soda, sulphate of magnesia, chloride of magnesium, sulphate of potash, carbonate of magnesia, with small quantities of lime and silicic acid. Friedrichshall, on the other hand, heads the list of ingredients with chloride of sodium, sulphate of soda, sulphate of magnesia, chloride of magnesium, sulphate of lime, and small amount of carbonate of magnesia, sulphate of potash, and carbonic acid. This Friedrichshall with its well-apportioned amounts of Glauber, Epsom, and common salt is described as an excellent empirical compound when taken in small doses. Hunyadi János, the richest of bitter waters, contains sulphate of magnesia, sulphate of soda, chloride of sodium, carbonate of soda, carbonate of lime, sulphate of potash, a small amount of oxide of iron, with silicic and carbonic acid. In an Indian district notable for impure nitre, common salt, and carbonate of soda; for brackish water; and for cotton cultivation replacing vegetables, sepoy's reduced to eat brinjals, else onions or carrots, sickened with rheumatism and scurvy in 1878, wheat, dal, rice, grain, and ghee, happening to be inferior or expensive. Elsewhere in 1879, grains being dear, natives also suffered with either fever or purpura, in places where mangoes were cheap and pot herbs abundant. Rheumatism from various causes crops up everywhere, and besides pilgrimages to legendary sacred springs or streams, those afflicted occasionally

resort to balneotherapy. In the Santal Parganas are bubbling pools of unknown properties. In the direction of Hazareebaugh, as already indicated (page 51), are various groups of springs, bursting through gneiss rocks at a temperature hot enough for egg boiling, and several streams combining into one, flow towards a pool of cold water eighty yards off. Plants and weeds mostly of a reddish colour flourish in the hottest directions, where the sand banks also are raised in temperature. The sulphuretted hydrogen bubbles greatly impress superstitious minds, and under the shade of the banyan or the peepul the devotees are bound, there temporarily, to speak the truth and be fairly honest in commercial dealings. In some localities cattle like the peculiar taste, and skin-diseased natives believe in baths. In the Chittagong hill tracts are bituminous thermal jets.

In the Monghyr district the rivulets of Sitakund and Riskikund flowing from rocks of red and grey jasper, else of quartz or siliceous hornstone, range in temperature from 92° to 138°, the heat diminishing at one period until commencement of rains, the bubbles fluctuating in effervescent activity. At Birbun in Burdwan the sulphuretted hydrogen jets of 162° temperature issue out of gneiss, quartz, felspar, with mica, and discharging 120 cubic feet of water per minute, flow into cooler streams of 83° where fish abound. The sulphur is not retained in solution. In twenty volumes statistically describing Bengal, are above localities mentioned without much information of medical interest. Seeking elsewhere, it appears that in 1854 Mr Marcadieu stumbled across a thermal spring near Tivah, ten miles from Dharm-

sala, elevated 4433 feet, and containing chloride of sodium, chloride of calcium, sulphate and carbonate of lime, bromide of sodium ; the temperature 108° ; the qualities resembling those of Bourbonne les Bains, useful in gout, rheumatism, dyspepsia, or liver torpidity. At Noorpoor, in Kangra he noticed also a thermal sulphurous spring containing hydrosulphate of soda, chloride of sodium, carbonate of soda, carbonate of lime ; in many respects corresponding to Barège waters, to be avoided by pulmonary invalids or those of hæmorrhagic type, but to be tried in cases of chronic rheumatism, obstinate skin diseases, old wounds, or carious bones. About eighteen miles of bad road from Simla lead to Jourah on the Sutlej banks, where hot springs abounding in sulphur and saline impregnations are less nauseous than those of Harrogate, and will keep good a year in bottle. The place, they say, could be rendered suitable for cold affusion after thermal bathing. In January the air temperature stood 51°, that of the river 41°, contrasting with the fourteen springs ranging from 82° to 132°. Earthquakes, rains, or river caprice may at any moment alter everything. Near Serahan (7000), on the Kotegurh to Chini road, are hot and cold effluent rills or runnels. Too often these curiosities are concealed in muggy valleys, else in lonely, damp, out-of-the-way, unhealthy spots, and soon decompose. Some of the thermal varieties, with a temperature of 207° at 11,000 feet elevation in Kulloo, are used for cooking rice ; and at one place with a forgotten name rheumatic travellers really find a Pool of Siloam. Sulphur springs are noted at Gwalior, Guzerat, Hazareebaugh, Landour ; and after a camp of exercise a number of neuralgic sol-

diuers, stiff in the joints, derived great benefit by bathing at Sona, thirty miles from Delhi. Oriental sores, bone diseases, diarrhoea, however, have been connected with sulphurous acid or sulphuretted hydrogen in water. At night, at Mean Meer, the latter gas evolved from the soil is specially offensive, and the saline, flat, brackish well water abounding in carbonate of soda, will corrode metallic vessels, will blast vegetation, and provoke diarrhoea, dyspepsia, or cancrum oris, perhaps purpura or scurvy, when the body is enfeebled by fever.

Saline waters are scattered about the country, besides along the salt range. Calculus and goitre to any extent do not affect Europeans or Eurasians. A third of the natives in the limestone district of Kumaon, according to M'Clelland, suffered with bronchocele, about one in thirty becoming an idiotic cretin, with barely enough intelligence to slave in copper mines. Cats and dogs were affected by the water. Inhabitants of siliceous and argillaceous rocks were found healthy. In countries with the greatest number of mines the water is said rarely to contain a small portion of iron, scarcely ever any particles of copper, never silver, lead, tin, zinc, cobalt, mercury, or arsenic. During the construction of the Baree Doab canal many males or females who, living on the spot, must have drank water charged with salts dissolved by chemical action on lime boulders at the hill base, were goitrous. Hot fountains alternating with icy-cold pools, in dark caverns at great altitudes, cannot of course be utilised. The waters of Kumaon contain lime, magnesia, soda, in combination with phosphoric, carbonic, sulphuric, silicic acid. At Nyna Tal native dyspepsia was

once attributed to carbonic acid, deficiency in the few wells. Chalybeate retreats near Chumba, Dalhousie (page 158), Dharmasala, Darjeeling, Landour, await European appreciation ; and though not numerous, probably there are other sources containing iron and salt, in such proportions as to make them readily absorbed, instead of inducing irritation. In Germany the spas containing iodine and bromine owe their properties to iodide of sodium and bromide of manganese, in a muriated saline water. About Chumba, the Jullundur Doab, the banks of the Beas and Ravee rivers (page 65), are somewhat similar combinations. In a portion of the outer parallel of the sub Himalaya, about seventy miles from Jullundur, and elevated 2000 feet, is the ancient and celebrated shrine of Jawalamukki, where out of crevices in the wall, and out of the sides of a dry little tank in the small temple, flames issue. No smoke, no smell, about four jets, each eight inches long, said to be naphtha, else carburetted hydrogen. Of course the Faithful believe the fire unquenchable, but sceptics say the priests light up when the guileless traveller approaches. At my prolonged visit the temple temperature was 80° in the afternoon ; there was no appearance of deception, and by agitation of the water in another tank one of the churchwardens contrived to start the gas burning on the surface for a few seconds, by means of a torch. The temperature of water in courtyard stone troughs was 60°, and the taste distinctly saline. Regardless of miracles, birds were flying about even inside the temple, where blackened walls are attributed to burnt offerings of butter and sugar. Sandstones (micaceous and variegated), argillaceous

marls, mica schists, quartz and granite, make up the geological features of these hill bases towards Kangra. In the neighbourhood, about four miles apart, are five springs all containing iodine, iodide or ioduret of potassium, with chloride of sodium, and held in great esteem by rheumatic natives who make long pilgrimages to worship and to drink. According to some investigators, lignite at Jawalamukki is mixed with bituminous shale and protosulphate of iron.

In some countries baths of green fresh pine leaflets are considered to exercise a soothing and tonic effect upon irritated bronchial membranes. At Bournemouth the fragrance of the pines crushes out the smell of the salt sea, and everywhere exists a certain amount of belief in balsam aroma. Up in the glorious Himalaya, where aristocratic deodars, the goodly cedars, and the most beautiful firs waft the odorous breath of their fan-like branches, the feeble invalid can inhale the purest air under heaven, and, if necessary, have recourse to mineral waters.

CHAPTER VII

HERBS AND SIMPLES

No. 1

AT Dalhousie, in attempting to catalogue the prominent properties of a few trees, shrubs, flowers, or grasses, it was necessary for reference to purchase the works of Drs Stewart, Brandis, Waring, Dutt, and Colonel Drury.

Marching fifteen days in April, from Sealkote to Banikhet, 133 miles, the prickly babul, jujube, wide-spreading banyan, feathery bamboo, the dhak in flower resembling sheets of flame, the branching pipal sacred as the birthplace of Vishnoo, the mulberry, sheesum, siris, toon, jaumon, the ruddy pomegranate, the gay Persian lilac, the kachnar of many colours, and a few stately palms, attracted attention. At Nynakote silkworms appeared busily occupied. From Pathankote a seven miles' drive in a native cart over a hard road ended at Madhopore, the cradle of the Baree Doab canal visible through a telescope from Bukrota. Thanks to mango groves, fruit trees, the *Eucalyptus globulus* (introduced in 1860), besides bright flowers and green bushes, the empty deserted little station, with its tiny red church, looked very pretty.

The flowers at Dalhousie include red and white wild roses, geraniums, dahlias, gentians, daisies,

buttercups, blue bells, violets, potentillas, pansies, portulacas, yellow and purple cowslips, primroses, blue and white anemones, columbine, lilies of the valley, tiger, crocus, and a perfumed lily, oft solitary, else associated with a regiment of purple iris concealed amongst blades of long grass in the charming woods; also marigolds, ranunculus, verbenas, calceolarias, asters, arum, for instance, the hooded cobra variety. Certain houses are trellised with jasmin, passion flower, purple convolvulus, or sweet-scented honeysuckle. Amongst the many ferns near shaded streams observe the oak, silver, golden, parsley, maidenhair, besides various other species. Ground ivy contributes to carpet dark cedar avenues, whilst the creeper unpleasantly embraces the oaks, else encircles tall trees not encumbered with soft velvet green mosses supporting ferns. About Dyne Kund, Kala Tope, or the forest of Kajiar, in July there are wild strawberries, red and yellow raspberries, white datura, blue aconite, purple heather, yellow barberry, to pleasantly contrast with homely clover and sweet lucerne grass. About the station fuchsias, petunias, and hyacinths may be seen cultivated in pots, and in August sweet peas, ruby dahlias, gaudy balsams, blue geraniums different to those resembling Virginia stock, are attractive, whilst snowdrops and crocuses colour some bleak hills in winter. Very easy is it to find endless resemblances to green familiar lanes, also in the neighbourhood of hawthorn, sweet briar, holly, and mistletoe, to forget for the moment how many thousand miles we exiles are away from England. In the civil cemetery above Baloon the few graves on steps and ledges are shaded by oaks and cedars. In the

Himalayas tree vegetation will cease at 12,000 feet ; wheat and barley at 15,000, and higher the rocks gradually are either bare, else clad with soft moss or grey lichen ; yet on the margins of rills formed by melting snow a pretty lilac annual provides food for goats at a height of 18,500 feet. At Dalhousie the hills after rain are green with jungle, or dense under-growth of barberry, merzereum, daphne, else bushes of roses, wild indigo, hemp, datura, pink balsams, and a pretty white flower, with an unpleasant smell, called *karyat* or hill chiretta, a valuable bitter tonic, especially serviceable in the bowel complaints of children. Boil two ounces of *karyat* leaves in two pints of water, else give in combination with sweet flag root and dill seeds for general debility, or with myrrh, aloes, and brandy for dyspepsia with bowel torpidity.

Barberry, vernacular *simlu*, *kemal*. Root, stem, and branches digested in water yield rasout, a febrifuge ; likewise a local application in catarrhal or rheumatic ophthalmia. Equal parts of rasout and burnt alum, half the weight of opium and lime juice, made into a paste to be applied round eyelids twice in twenty-four hours. Rasout can be prepared by boiling equal parts of barberry decoction and milk till reduced to an extract. This decoction is prescribed for various skin diseases, diarrhoea, jaundice ; and rasout for infantile thrush. Macerate twelve ounces of barberry root bark in two pints of spirit seven days to produce tincture of berberine, so useful an antiperiodic in half-ounce doses in malarial fevers, yet in excess likely to paralyse dogs or rabbits.

Datura.—White variety very luxuriant, the seeds and leaves smoked in ten-grain doses with tobacco

for asthma, the leaves applied to boils and ulcers, the tincture in ten-minim doses narcotic, the poultice of leaves and linseed meal, the fomentation of leaves, the liniment of an ounce of seeds in a pint of sesamum oil, all valuable as anodyne applications as detailed in Waring's useful little book about bazar medicines. An enema of the leaves in hot water though of service in dysentery may poison the patient, the absorption by bowel only too easy as a matter of experience.

Cannabis sativa—*bhang*.—Under the latter name the larger leaves and seed vessels without stalks; *ganjah* being the dried flowering tops of the female plant from which the resin has not been removed, and *charas* the resinous exudation of leaves, stems, and flowers. Both *bhang* and *charas* are used,—the tops, exudation, seeds, hypnotic anodyne, antispasmodic: the tops in bruised pulp applied to painful tumours. Infantile convulsions, tetanus, rheumatism, neuralgia, asthma, spasmotic coughs, menorrhagia, certain phases of headache have been relieved by hemp, which, free from objections peculiar to opium, can be administered in the shape of extract, tincture, or very palatably as the insinuating, intoxicating combination with sugar, butter, flour, milk, and attar of roses, termed *majoom*, sold in Calcutta at four rupees the seer. A drachm by weight of this sweet-perfumed confection will, according to Dr Dutt, intoxicate a beginner. To induce sleep or relieve pain the powder of the fried leaves of *cannabis sativa* recommended.

Daphne, v. gandalum,—the bark given for colic, the leaves applied to abscesses, the red berries apt to provoke nausea. *Balsams, v. pallu*.—Expressed

oil substituted for til or olive for burns or ulcers. *Carissa*, v. *karaunda*.—A prickly shrub with small, stellate, scented white flowers, succeeded by dark berries, suitable for sick-room jellies; the wood reported tonic and cholagogue. *Heliotropium Indicum*, v. *hatee-shooro*.—Astringent, the juice of leaves applied to gum boils, face pimples, also to stings and bites.

Helianthus annuus, sun-flower.—Seeds yield oil equal to poppy, the stems contain nitre and potash in abundance, and from the reputation elsewhere of purifying the atmosphere, it might be expedient to cultivate the flowers in the vicinity of latrines and urinals and down muggy ravines. *Ivy*, v. *karur*.—Leaves have been added to strengthen beer, and a resinous extract hederine formerly used.

Mistletoe, v. *banda*.—Clinging to apricot, peach, pear, maple, walnut, elm trees, seldom to oaks, and considered remedial for enlarged spleen and earache. One variety growing on *nux vomica* trees near Cuttack, found in 1837 to contain strychnine and brucine sufficient in half a drachm of powdered leaves to kill a man mistaking them for cubebs in less than an hour. *Nux vomica* is mostly known in Southern India, not familiarly in the Punjab.

Holly, v. *karelū*.—Berries probably poisonous; a shrub called *amudanda*, a species of barberry sometimes mistaken. Formerly prescribed for epilepsy. *Hawthorn*, v. *phindak*.—Whether the leaves are added to those of tea, or if any spirit be extracted from the haws as in England, no allusions in books. *Ferns*.—In August the maidenhair, v. *dum tuli*, prescribed for fever, exhibits flowers scented little tassels of violet and gold; *Adiantum caudatum*, v.

gunkiri, is said to relieve headache; *Adiantum venustum*, v. *ghas*, anodyne in bronchitis and a good local application for bruises. The male shield fern here enjoys no celebrity as an anthelmintic. Lichens are applied to burns. In August mushrooms and fungi, freely eaten by natives, cannot be very poisonous. An edible mushroom will always peel, and if an onion or a rupee be added to the boiling water the colour should not turn black. According to Dr Stewart there ought to be truffles in this neighbourhood. It is so difficult to obtain accurate information, and though stimulated by largess to collect plants, and to bring native names for identification by book reference, neither hakims nor peasants helped much. They would come in laden with creepers, flowers, branches, leaves, or twigs, about which they knew nothing and cared less; all termed "jungly," and as for books to aid compilation, none can be borrowed to augment the private stock. The villagers brought *Pyrus variolosa*, vernacular *keint*, a tree like the medlar, *Coccinea*, v. *kundru*, a fruit eaten uncooked; the tap root juice good for diabetes. *Marlia begoniae*, v. *sialu*; *Adelia senata*, v. *ohirdni*; *Glochydion*, v. *sama*, three small trees credited with no special virtues. *Amaranth spinosus*, v. *chaulai*, a thorny weed adapted for emollient poultices. *Crizophora plicata*, v. *nilkantha*, the ashes of root to relieve infantile coughs. *Adhatoda vasika*, v. *basuti*, a small shrub with white pungent flowers; the leaves and root good for asthma, bronchitis, phthisis, haemoptysis, rheumatism; the flowers locally applied for ophthalmia. *Salvia lanata*, v. *halu*, a kind of mint; the root for coughs, the seeds for colic, dysentery, haemorrhoids, the leaves applied to guinea

worm, itch, and wounds. *Xanthoxylon hostili*, v. *timbar*, a prickly shrub stomachic, carminative, a pain killer of toothache. *Rhus acuminata*, v. *titri*, a very handsome tree, the leaves turning from orange to scarlet, the juice escharotic, the horn-like excrescences on branches reported beneficial for asthma and phthisis. *Arum speciosum*, v. *kiralu*, the poisonous root of the cobra-hooded species applied to snake bites, the fruit liable to cause cancrum oris. *Arum campanulatum*, v. *jimikand*, has a potato-like root, edible after repeated washing before boiling to remove acridity; useful in boils, ophthalmia, acute rheumatism, haemorrhoids; the tubers are roasted, else made into confection with treacle. *Ocimum basilicum*, sweet basil, v. *tulsi* or *rehan*.—Seeds steeped in water prescribed for coughs, dysentery, stomatitis, after-pains of labour; the juice of leaves of one variety prescribed for ague, else used for ear-ache; the juice of another given in infantile catarrh, the root decoction in fevers, the root with lime juice applied as a ringworm paste, the dried leaves snuffed up nostrils to dislodge maggots. *Althaea rosea*, hollyhock, v. *khatmi*, the seeds demulcent, diuretic, febrifuge, the flowers recommended for rheumatism. *Portulaceæ*, v. *chotalunia*, well-known pretty little flowers of various colours, each with regular hours for opening and shutting, and specially beautiful in the hospital garden at Subathoo. The fresh leaves make poultices to soothe erysipelas or dysuria; the seeds astringent, demulcent, have been known to produce stupefaction. *Symplocos racemosa*, v. *lodha*, a very attractive little tree with white snow-like flowers, scenting the air near Banikhet, the bark cooling astringent to attack bowel complaints else

utilised as a wash for spongy bleeding gums, or combined with liquorice root, rusot and burnt alum as a paste for ophthalmia. *Sorghum Halepense*, v. *baru*, a tall grass likely to poison cattle who, unless comatose, are said to seek an antidote in a sprig of *Asparagus filicenus*, v. *sanspaur*, a graceful prickly shrub resembling a dwarf larch shoot with tonic astringent properties, and in some respects like *salep mierie*, the prepared tubercles of orchideous plants imported from Cabul, Persia, and Turkey. It is not unlikely that *salep mierie* grows near Chumba as in Dehra Doon, a light demulcent bland nutritious food for infants and a remedy for dysentery. But the real orchid is so expensive that at Meerut a spurious, useless, if not dangerous, imitation was sold in the bazar to the best of my belief. *Dioscorea deltoid*, v. *tharri*, a plant with an acrid root, a large yam which, after steeping in ashes and water and boiled, can be eaten. The medicinal properties of the leaves uncertain. *Valerian*, spikenard, v. *jatamansi*, a fragrant root placed by servants in wardrobes, a nervine tonic, antispasmodic remedy for hysteria, epilepsy, convulsive affections, chorea, flatulence, functional palpitation of the heart. A tincture of five ounces of root to two pints of spirit might be given in drachm doses, else a wineglass of infusion of two drachms of root to half a pint of boiling water as detailed in the 'Pharmacopœia' and by Waring, who suggests the addition of ammonia, camphor, and aromatics. According to Udoj Chand Dutt, this Indian spikenard has been appreciated by natives from a very ancient period, and considering how prone hill visitors are to several of the maladies just enumerated, there would be no harm in prescribing

jatamansi at Dalhousie, where the fresh-scented stringy root can be so readily procured.

No. 2

Abelia Triflora—native name *khut*. A pretty shrub bearing white scented flowers; the root prescribed for rheumatism.

Abelmoschus esculentus—*bhinda*. Edible hibiscus, emollient, demulcent, diuretic; the seeds cordial.

Acacia Arabica—The well-known *babul*, with its thorns and scented silken yellow button-like flowers; a decoction of the bruised bark, an ounce to the pint, useful internally for chronic diarrhoea, else locally as injection, enema, gargle or wash, in combination with other astringents; the leaves as poultices to sanguous ulcers; the red gum and pods taken internally to relieve rheumatism, coughs, mucous discharges, diabetes.

Acacia speciosa—*siris*. A well-known tree bearing white fragrant flowers, applied to boils and swellings; the bark and leaves also to snake-bites, ulcers and sore eyes; the oil given for leprosy; the gum and seeds for certain varieties of ophthalmia, piles, and diarrhoea.

Achyranthes aspera—*apamarga*. A troublesome weed; the dried plant applied locally for infantile colic, else prescribed internally as a laxative and promoting secretion; the ashes, containing much potash, suitable to prepare alkaline medicines and caustic pastes, as detailed by Dutt.

Aconitum heterophyllum—*atis*. The bitter, white tuberous root; tonic, astringent, stomachic, in five grain doses in powder, and a valuable antiperiodic

in half-drachm doses every morning or during apyrexia; combined with ginger, *gulancha*, *cyperus rotundus*, and *holarrhena dysenterica*, serviceable in infantile fever, diarrhœa, cough, or stomach irritability.

Acorus calamus—*bach*, sweet flag root. Emetic in eighty grain doses; stomachic, tonic, antiperiodic, stimulant, diaphoretic in smaller doses; recommended in low adynamic fevers and certain phases of asthma, diarrhœa, gout, or dyspepsia. An infusion of one ounce of bruised root to ten of boiling water; the adult dose two ounces. The dried rhizome rubbed up with cashew spirit a local application for rheumatism.

Ægle marmelos—*bael*. Not grown near Dalhousie, but this tree, sacred to Siva, cannot be very distant, as baskets of the fruit were in great demand during rain or hill diarrhœa. According to the 'Indian Medical Gazette' specimens have reached England, and remained in such excellent condition a month after landing that Sir J. Fayrer was enabled to exhibit the fresh fruit when lecturing on the varied virtues of bael. Useful in chronic dysentery, irregular action of the bowels, in habitual constipation, scurvy, and also in the teething dysentery of children. Ripening after the rains, and in abundant perfection during cold weather, the astringency diminishes as the fruit matures. Take of the soft tenacious fluid of the fruit interior two ounces, water four, add two of sugar. For bael preserve the fruit less than half ripe, the seeds and gum removed. For jam the pulp should be passed through a coarse sieve. There are combinations with astringents, namely, catechu, and with tamarind juice or the dried

shells of mangosteen. The dried fruit being aperient, it may be necessary to use burnt bael to control diarrhoea. The officinal liquid extract prepared by macerating dried fragments in water and spirit cannot be depended upon. Fresh juice of leaves prescribed for asthma, anasarca, and jaundice, and externally applied to relieve local inflammation, or as poultices for ophthalmia the leaves themselves ; the root bark febrifuge ; the oil a good local application in chronic bowel complaints. According to Dutt the leaves are in request for various ceremonies, and it is sacrilegious to uproot, damage, or neglect the bael tree, under whose shade the most vile of dying sinners will expect to pass through the gates of Paradise.

Andromeda—Eilan. Seeds and young leaves poisonous in spring to cattle ; the honey produces headache ; the leaf juice is a local application for eczema. The variety termed Indian Wintergreen yields at Darjeeling and the Neilgherries antispasmodic gaultheria oil and carbolic acid, reported purer than that derived from coal tar.

Andropogon muricatus—khus-khus grass. Antispasmodic, diaphoretic, diuretic, emmenagogue properties attributed to the fragment roots ; the smell of the oil suggestive of cooling tatties.

Asteracantha longifolia—tal makhana. A small annual ; the seeds, leaves, roots, and ashes tonic, diuretic, and prescribed for rheumatism.

Artemisia Indica—chambra. A common plant of aromatic odour and bitter taste, the leaves and tops tonic, stomachic, antispasmodic, and an infusion of same a good fomentation in phagedænic ulceration. Stewart, on the authority of Bellew, states that in

Afghanistan a strong decoction is given as a vermifuge, and a weaker one to children in measles. In the Indian Pharmacopœia the unexpanded flower-heads of an undetermined species of *Artemisia*, a Russian plant yielding Santonine, are contrasted with *Artemisia vulgaris* (Mugwort) and *Artemisia absinthium* (Wormwood); the flower-heads of the former neither round nor hairy. *Artemisia abrotanum* (Southernwood) remarkable for fragrant leaves, and *Artemisia lactifolia* for clusters of the milk-white fragrant flowers, are credited with depurative properties, and the smoke of the branches of the latter plant is considered good for burns. Under the designation of *dona* or *nagdona* come the native names, but neither Firminger, Drury, Stewart, Dutt, Waring, Brandis, nor any other available authorities, point out which yields Santonine, termed by Ringer the active principle of worm seed, and by Wood a crystalline principle derived from *Artemisia contra*, a composite of Asia Minor, and consisting of pale greenish-brown smooth heads of four or five tubular flowers, of strong aromatic odour when rubbed, and a bitter taste; a description corresponding with that of *Artemisia Indica*.

Argemone Mexicana—*kateeli*, *bhurbhand*, gamboge thistle, devil's fig, horned poppy. A prickly, troublesome, yellow-flowered weed, yielding from the seeds an aperient oil, said, when freshly prepared, in half-drachm doses to relieve colic, and, as a local application, to soothe burns, ulcers, and herpetic eruptions.

Azadirachta Indica—*nim*. Does not grow near Dalhousie, and although *bakain* is somewhat similar, the natives, much preferring the *nim*, hope eventually

to rear the latter, which from a very remote period has justly been appreciated in medicine, also held sacred and used for making idols. The bark, astringent, alterative, tonic, antiperiodic, may be given in drachm doses, the tincture in the same quantity, or else two ounces of the freshly prepared decoction, especially in ague, dyspepsia, rheumatism, and nervous disorders. The fruit is purgative, and from the pulp an antiseptic anthelmintic oil, useful externally to relieve neuralgic pain, is expressed. The seeds kill insects, and the kernels are utilised for hair washing. The sap is stomachic, and gum exuding from the bark has stimulant properties. The leaves combined with rice flour or linseed meal make excellent poultices to relieve any local sufferings—sloughing, ulceration, sprained joints, or indolent glandular swellings, and a fomentation answers for the same purposes. Besides combinations in washes, ointments, liniments, the soothing leaves will protect variolous pustules. The juice and decoction are internally prescribed for ague, jaundice, boils, prurigo, psora, urticaria. The ravages of insects are thwarted by placing *nim* leaves in wardrobes, which also can be constructed out of the hard, durable, mahogany-like wood. In fever districts natives immerse bitter twigs or chips in drinking water, or else use cups, flagons, filters, syphons carved out of this precious and wonderful tree.

Azadirachta—Melia sempervirens—bakain, the Persian lilac, the bastard cedar, the bead: so handsome in April, lining green avenues on the road approaching the Ravee, had then honey fragrant clusters of lilac-coloured flowers, with foliage resembling that of ash. The specimens in September noticed exhibited

green bitter berries, which later appear as ugly bunches of yellow fruit. Replacing the *nim* in the Punjab and Darjeeling, this bastard cedar has a claimant to the same title and properties in *Soymida febrifuga*, *rohun*, Indian red wood, an astringent, tonic, antiperiodic, growing in the mountain forests of Malabar, and by the sceptical said to be *nux vomica*. The root bark of *bakain*, administered in decoction, being anthelmintic, may in large doses induce temporary stupour. Poisonous properties are ascribed to the fresh leaves and berries. Seeds given for rheumatism, else used locally as anodyne liniment.

Bauhinea variegata—*kachnar*, mountain ebony, an object of glorious splendour when the tree is an entire mass of handsome purple and white pelargonium-like flowers, as observed at Meerut, Delhi, Agra, along the Ganges Canal near Roorkee, and sparingly between Sealkote and Dalhousie. The Emperor Baber, who so dearly loved landscape scenery, introduced this tree to grow over his tomb in Cabul. Sleeman, wandering about Oude, generally endeavoured to encamp in shady groves variegated with *kachnar* trees, which grow also near Puchmurree, and are all the more appreciated about the Darjeeling district when the country becomes arid. Leaves, seeds, buds, flowers, are eaten by Paharias. Bark alterative, tonic, astringent, recommended internally for fevers and to cure enlarged scrofulous glands. Root-bark alterative, vermifuge; leaves useful in dysentery, and the seeds tonic; bruised bark applied to certain tumours.

Bambusa Arundinacea—*bans*, the well-known bamboo, so useful for splints in an emergency on the

march. Siliceous concretion in joints of female bamboo said to be beneficial in fever, asthma, coughs, haemoptysis; seeds a valuable food in famine times; ashes rich in silica. Some assert, whilst others deny, that the root is diuretic, the bark specific in skin diseases, the leaves emmenagogue.

Bassia latifolia—*mahwa*. Large tree, cream-coloured flowers, with sweet taste and sickly smell. Shed at night, collected next morning, these flowers after sun-drying are eaten, else distilled into a pungent, poisonous imitation of whisky when drunk as a fresh spirit, but if mellow, matured, diluted, a diffusible stimulant, suitable for all hospital requirements. By expression the seeds yield a fixed concrete oil, used to adulterate ghee, to make soap and candles, or else in combination with sesamum seeds as a liniment for headaches, rheumatism, neuralgic pains.

Begonia—elephant's ear. Of the numerous tribes of this pretty little plant a few grow unheeded on Dalhousie hill sides. The fleshy leaves dotted with red and silver, the flowers rose coloured, the sour stems convertible into sauce for greasy meats.

Bignonia—*chali*. Ornamental plants, scandent shrubs, or tall trees, with dull red and yellow unpleasant-smelling flowers. To the best of recollection, that glorious creeper, *Bignonia Venusta*, in cold weather a blaze of vermillion, observed in gardens at Agra, Delhi, Cawnpore, Lucknow, Benares, Ferozepore, Jullundur, Umritzur, Lahore. This and the pale crimson *Bugainvillaea* climber will make hospital compounds very smart, cheerful, and attractive. In elevated valleys between hills will be found *Bignonia Indica*, *tatmorang*, a small tree with large,

flat, sword-like fruit, applied to abscesses and prescribed for headache. The root bark astringent; tonic for diarrhœa and dysentery. *Bignonia suavolens*—*padal*, a tree with dark crimson fragrant flowers, the root bark diuretic, the ashes extremely alkaline.

Bombax—simmul. A tall tree with buttressed trunks, showy red flowers and silky pods, containing cotton adapted to stuff beds or pillows. The gum astringent, especially suited for infantile dysentery, and the root for intermittent fever.

Butæa frondosa—palas, dhak, Bengal kino. A fair-sized tree, noticed at Hurdwar and Pathankote in April, when the bright orange-red flowers, as Hooker said, resemble sheets of flame. Otherwise the tree, with crooked stem and ungainly branches, is ugly. Praised by poets, worn by women in their hair, and offered as garlands in temples, these scarlet flowers used to stain cloths during the *holi* festival, are further given in decoction to puerperal women, and as poultices applied to bruises. The gum resembling catechu answers admirably for children, and is also a valuable external astringent application. The seeds in scruple doses, thrice daily, three days, followed by castor oil, will expel lumbrici affecting adults, unless the patients are susceptible to diarrhœa or renal irritation.

Cæsalpinia bonduc—*katkarang*, the *bonduc* or fever nut, a scandent, straggling, prickly shrub, with yellow flowers, sometimes used to strengthen garden fences. Bark in ten-grain doses antiperiodic. The nuts ovoid, half an inch in diameter, smooth, grey externally, containing a white bitter kernel. The seeds containing a fixed oil, resin, and acrid sub-

stance, besides their tonic and antiperiodic properties, are also applied as local anodynes, the leaves emmenagogue, the oil said to control convulsions. In scruple doses thrice a day, a powder of equal parts of shelled *bonduc* seeds and black pepper appears officinal amongst antiperiodics.

Cæsalpinia sepiaria—*relme*, Mysore thorn, a prickly hedge climber with yellow flowers; the bruised leaves applied to burns; the wood astringent, resembling *sappan*, a substitute for logwood.

Calotropis procera—*mudar*. A shrub or tree flourishing in dry places, with purple-red strong-smelling flowers, and abounding with acrid milky juice poisonous to newly-born infants, a drastic purgative and a good local application to sinuses or carious teeth. Flowers stomachic, digestive, and of service in asthma. Leaves make anodyne poultices. The root bark, if properly, seasonably collected and prepared, might be substituted for ipecacuanha. Waring gives full directions, and the *Pharmacopœia* suggests three to ten grains of mudar powder as alterative, tonic, diaphoretic, serviceable in leprosy, rheumatism, dysentery.

Cathartocarpus fistula—*amultas*, Indian laburnum, pudding pipe tree, with dark green foliage, large bright yellow flowers, and long cylindrical black seed pods; the pulp laxative, the root purgative, febrifuge, the fragrant flowers stomachic, the leaves and bark applied to pustules, the gum astringent resembling kino. Fine specimens noticed at Saharanpore, Sealkote; and at Mooltan admiring natives often loitered about the Rajataru or king of trees in the public gardens.

Carica papaya—*papaw*. Small tree, rhubarb-like

leaves, yellow fragrant flowers. In some places, to make meat tender, tough joints are suspended under branches, else steeped in diluted milky juice exuding from rind of unripe fruit, which in curry is said to be galactagogue. The milky juice emmenagogue, antiperiodic, also anthelmintic, in table-spoonful doses, combined with honey and water, to expel lum-brici. The mustard-and-cress-like seeds purgative, emmenagogue.

Cedrela toon—*toon*, a stately tree in April, laden with fragrant lily-of-the-valley-like flowers considered emmenagogue, the bark astringent, antiperiodic, antidyserteric.

Cedrus deodar—*kelu*. About twelve miles from Dalhousie, descending towards Chumba, is the valley of Kajiar elevated 6000 feet, a green gap in the forests, a beautiful meadow about half a mile long, 400 yards broad, and encircled by the most magnificent deodars. In one direction the dense dark woods ascend tier upon tier towards Dyne Kund, over 9000 feet, and in the other will be noticed the distant snow-clad peaks beyond the northerly mountain waves. At Kajiar the proximity of the miniature central lake and swamp should be avoided by feverish subjects encamping, although deodars are credited with exhaling antiseptic odours, and their presence often indicates a healthy gneiss or granite soil. The aromatic wood, carminative, diaphoretic, diuretic, locally used for neuralgia, the leaves and twigs tonic, the coarse turpentine applied to ulcers.

Celtis Caucasic—*khark*, a kind of elm with yellow flowers and fruit recommended for colic.

Cinnamomum albiflorum—*tamala*, an evergreen

with white flowers and aromatic leaves, reddening in May, and together with the bark, called *tezpat*, a remedy for rheumatism.

Oleome spinosa—*barari*, a description of caper; seeds anthelmintic, carminative, bruised leaves rubefacient, roots applied to sores.

Colebrookia oppositifolia—*durs*, shrub; sage-like leaves, chocolate flowers, both applied to bruises.

Colocasia antiquorum—*rab alu*, a yam-like artichoke; the pressed juice of petioles styptic. A gourd called *Cenicassa cerifera*—*kumra*, resembling vegetable marrow, is said to be tonic, diuretic, and specific for haemoptysis.

Cordia Myxa—*lasora*, a small tree, white flowers, rough ugly foliage; seeds given for ringworm, the plum or cherry-like fruit demulcent, diuretic, the bark tonic.

Cotula anthemoides—*babuna*; heated flowers applied to rheumatic joints, root purgative emetic. The term *babuna-ka-phul* is applied to chamomile flowers.

Orinum defixum—*sooka dursun*, plant, narrow leaves, white flowers fragrant at night; the leaves useful in whitlow, the leaf juice, in earache, the root emetic, and the leaves substituted for ipecacuanha.

Cuscuta reflexa—*banausha*, plant, scented flowers; seeds carminative, cholagogue, and locally anodyne.

Crotalaria burhia buta, rattlewort, a bushy weed; yellow flowers resembling broom; the leaves diuretic, diaphoretic.

Cydonia vulgaris—*bihi dana*, quince; seeds demulcent tonic and useful as decoction in inflammatory dysentery.

Cyperus rotundus—*motha*. A plant, the tubers

egg-shaped, fragrant smell, bitter taste, and said to be stimulant, diaphoretic, diuretic, and very useful in fever, diarrhoea, dyspepsia, according to native physicians.

No. 3

In October a sudden order to proceed from Dalhousie to Dharmshala, seventy-seven miles distant, afforded an opportunity of visiting Kangra Valley, where the fever of golden rice fields meets a powerful foe in an army of green bushes yielding delicious refreshing tea, which, eliminating urea from the body, can oft combat the coma of blood poison. Potent against heat and cold, increasing skin action, stimulative and nerve restorative after great fatigue, and a purifier of water, cheap, convenient, portable tea, by its worst enemies can only be accused of tanning dyspeptic stomachs or spoiling the sleep of those indulging in excess. As yet there is no evidence of much adulteration with leaves of elm, willow, poplar, oak, plane, or horse chestnut. As yet, also, no personal research brings to light the therapeutic properties of the filbert, maple, or sycamore. Birch at 9000 feet elevation, forming a forest of itself, affords a bark used as writing paper or umbrella covers, and astringent qualities are assigned to the variety termed *bhurjapatra*. There are four kinds of mulberry, namely, purple, white, black, and the common variety, upon the leaves of which the silkworms feed. At one time Subathoo was selected as favorable for sericulture, but Dehra Doon and the vicinity of Pathankote amongst other places were preferred. Silk dyers are accused of breeding communicable fevers in uncleanly habita-

tions. Mulberry fruit is mildly laxative, refrigerant; the juice is adapted for gargles, else applied to wounds, ulcers, gouty limbs. Bird-cherry bark is reported febrifuge. Beautiful specimens of foxglove were noticed at Simla and Nynee Tal, but not at Subathoo, Mussooree, Dalhousie, or Dharmasala. Books allude to the plant as flourishing at Murree, Darjeeling, and Ootacamund. From Saharanpore henbane is sent to hospitals, but, wherever cultivated, is an uncertain remedy, often inert. The 'Lancet' tells of a lady becoming delirious, with vision as to size and colour of objects perverted, after taking a sixth of a grain of hyoscyamine, the amorphous alkaloid. One species in Beluchistan, called *kohi bung* or mountain hemp, is a powerful poison. The term *bikh* includes amongst other meanings the dry roots of *Aconitum ferox*, *napellus*, *palmatum*, *luridum*, four species of wolf's bane, but the most deadly monkshood comes from the mountains of Nepaul. Roots are more active about the flowering period, and the acrid principle may retain virulence ten years. However valuable in fever or rheumatism, aconite appears mostly appreciated as convenient for homicidal transactions. Amongst a number of humble lowly plants the homely dandelion might be utilised more. In certain localities village Culpeppers are inoffensive Mahomedan fakirs, familiar with herbs, simples, shrubs, and flowers of the neighbourhood, else cultivated in their own little gardens and sacred groves. Years ago it was suggested to encourage such men to exercise priestly influence as forest conservators, provided botanical energies or researches were not culpably directed to toxicological pursuits of a venial character. Amongst poisons may be mentioned

opium, aconite, datura, the tuberous root of *Gloriosa superba*, v. *bishalanguli* (a slender climbing plant with flowers of long petals, half deep crimson half primrose at first opening, then altogether crimson), oleander, the milky juices of *Calotropis gigantea*, v. *madar*, and of *Euphorbia nerifolia*, v. *mansasij*.

As several of these poisons have other properties, they must be included in the general list.

Abroma augusta, v. *olutkombol*, a large sombre shrub, dark green leaves, blood-coloured flowers; the slender fresh roots in half-drachm doses, combined with black pepper, to relieve dysmenorrhœa and induce conception. Formerly called perennial flax.

Abrus precatorius, v. *goonj*, a substitute for liquorice; a creeping shrub, small purple flowers, white or scarlet seeds, used as grain weights, or to make necklaces. Root demulcent, white seeds poisonous, the symptoms closely resembling those of cholera.

Celastrus paniculatus, v. *sankhir*, climbing shrub, greenish flowers, yellow, pink wood; the rusty brown seeds internally the leaves externally for rheumatism; the scarlet oil in ten-minim doses stimulant, diaphoretic, and externally vesicant.

Dalbergia sissoo, v. *shisham*.—Night air in the plains oft perfumed by the fragrant greenish-white flowers of this useful tree, which gradually starves on the saline soil over kunkur at Mean Meer. Wood raspings said to be alterative.

Emblica officinalis, v. *amla*.—Between Dalhousie and Dharmasala a very handsome tree with graceful foliage. Small, sour, green fruit, called emblic myrobalans, considered antiscorbutic, astringent; the yellow flowers refrigerant; the seeds cooling;

the bark, leaves, and root astringent ; the fresh juice laxative. Infusion of leaves applied to sore eyes, a paste of root bark to infantile thrush, and twigs are used to purify water impregnated with vegetable matter. An aromatic confection of emblic myrobalans recommended for painful dyspepsia.

Clitoræa ternata, v. *aparagita*, musselshell creeper, with blue or white flowers ; the roasted seeds, combined with acid tartrate of potash, purgative, the root bark demulcent, the leaves to alleviate the fever of variola.

Euphorbia Antiquorum, v. *thor*, *narsij*, a prickly shrub sacred to serpents, and planted on house tops instead of a lightning conductor. Juice corrosive, purgative, rubefacient ; resin acrid, drastic, emetic, and though a dangerous remedy, believed to benefit chronic affections of rheumatic, neuralgic, or gouty character.

Feronia elephantum, v. *kait*, wood-apple tree, pale green fruit, rancid pulp, dull red flowers ; the unripe astringent fruit tasting of turpentine, the ripe fruit antiscorbutic, the leaves stomachic, carminative, the bark exudation a kind of gum.

Ficus Bengalensis, v. *bargad*, banyan tree. Juice applied to carious teeth or sore feet, seeds tonic, bark infusion alterative, else used as astringent gargle, lotion, or injection. Of the many varieties of the fig tribe the leaves, bark, fruit, mostly astringent ; the common fig laxative ; the fruit, seeds, bark, and acrid milky juice of *Ficus oppositifolia*, v. *rumbal*, emetic, antiperiodic.

Ficus religiosa, v. *pipal*, the poplar-leaved fig tree reverenced by Buddhists. Elephants and silk-worms like the leaves, birds enjoy the fruit, and on

the march it is better to draw water elsewhere, if possible, than out of the old polluted village well under the cool dark shade of the sacred *pipal*. Seeds alterative, leaves and young shoots purgative the powdered root bark applied to aphthous sores.

Fraxinus ornus, v. *anjan*, much resembling the common ash. Berry juice prescribed for spleen disease or scurvy. Manna ash, yielding the well-known saccharine laxative juice, is a Sicilian tree.

Grislea tomentosa v. *dharee*, a small tree, drooping branches, coarse foliage, small tubular scarlet flowers secreting much honey. Dried flowers stimulant, astringent, prescribed for various haemorrhages, or infantile dysentery, else sprinkled over ulcers.

Gynocardia odorata, v. *chaulmoogra*. A large evergreen of the Darjeeling Terai up to 4000 feet, a tree bearing fragrant flowers in May. Hard round fruits on stem and branches. Pulp used to poison fish by the Lepchas, who, however, eat the same after boiling. Seeds an inch long, ovoid, irregular; shell, greyish brown, contains a large kernel, yielding by expression a yellow pale sherry coloured oil of unpleasant taste and smell. Seeds prescribed in six-grain pills, the oil in six-minim doses, gradually increased. *Chaulmoogra* has proved so valuable an alterative and tonic in scrofula, glandular swellings, general debility, the wasting diseases of children, that the oil is attaining European celebrity. Applied externally for cutaneous affections. Doctors differ as to relative merits of *Gurjun* and *Chaulmoogra* oil for leprosy.

Hemidesmus Indicus, v. *anantamul*, Indian sarsaparilla, sold in bazars; the fresh quill-shaped, aromatic, bitter root in infusion alterative, diuretic,

diaphoretic, very palatable with milk and sugar, a convenient combination with various medicines, a capital tonic for weakly children, else for adults afflicted with chronic rheumatism, dyspepsia or secondary syphilis.

Holarrhena anti-dysenterica, v. *kawar*. Small tree or milky-juiced shrub with white flowers, long follicles, pale green foliage, brown, acrid, oat-like seeds. Black, spongy-bitter bark in decoction or watery extract specific for dysentery, the toasted seeds febrifuge, the leaf juice and fruit astringent.

Ixora bandhuca, else *coccinea*, v. *rungun*, ornamental plants with fragrant blossoms, the superb crimson *bandhuca* offered at the shrines of Vishnu and Siva; and called the flame of the woods when used for torches. *Ixora coccinea*, a most beautiful shrub, with bright scarlet flowers contrasting with bay-green leaves. According to Assistant-Surgeon Umrito Lall Deb, the fresh slender root ground on a curry stone with long pepper and mixed with water will prove almost as efficacious as ipecacuanha in dysentery. The taste aromatic and pleasant, the dose about half a drachm, else a drachm of the tincture, which also contains long pepper.

Jasminum grandiflorum, v. *chameli*, *bel*, *mugra*. Many varieties, including the familiar English jasmine with sprays of white flowers, yielding scented oils. Leaves given internally in skin diseases or stomatitis, else locally applied for earache.

Jatropha curcas, v. *kadam*, *sa fed ind*, the angular physic nut. Hedge shrub yellow flowers, the seeds yielding an oil, fifteen drops as powerful as an ounce of castor, or locally employed, when diluted, an excellent embrocation in chronic rheumatism. Leaves

locally applied or given in decoction as galactagogue. Warmed and rubbed with castor oil the leaves also are locally used to hasten suppuration. Seeds have proved an acro-narcotic poison. Milky juice so powerful a haemostatic that Dr. Evers by hypodermic injection was enabled to coagulate most satisfactorily a small aneurism. The seeds of *Jatropha multifida*, the coral plant, or physic nut, a herbaceous shrub with bluish-green leaves, above which spring most beautiful clusters of red coral-like flowers, are still more powerfully purgative if not poisonous.

Juglans regia, v. *akhrot*. Glorious walnut-trees about Chumba, Solon, Pangi, Cashmere, but not on the Nilgherries according to Firminger. Oil used for cooking, the bark as dentifrice, else prescribed as astringent; nuts have a very hard shell, and the percentage of good ones marvellous. In America the inner bark of white walnut yields juglans, a mild cathartic resembling rhubarb.

Juniperus communis, v. *nuch*, *pama*. Berries called *abkul*, *huber*, diuretic, carminative, stimulant; twigs and leaves burnt to fumigate sick rooms. The species yielding savin introduced into Darjeeling.

Kalanchoe, v. *talara*. Fleshy-leaved plant, yellow flowers; the burnt leaves applied to abscesses.

Lawsonia alba, v. *mhindi*, *henna*. Shrub resembling myrtle or privet, affords a red dye, and can be utilised as paste to soothe burning of the feet or cutaneous irritability. Oil prepared from scented greenish-white flowers inhaled or applied locally to relieve headache. Henna makes a hedge to hide ugly places near hospitals.

Matucoria, v. *babuna*. A description of chamomile with same stimulant tonic, carminative, anti-periodic

properties ; the oil from flowers internally for flatulent colic, and externally in liniments for sprains, rheumatism, neuralgia suggested.

Messua ferrea, v. *nagsura*, iron wood tree of small size, dense foliage of brilliant crimson leaves, white fragrant flowers, scenting the air of Assam in April. Dried flowers stimulant, bark and root infusion tonic, oil applied to painful joints.

Michelia champaca, v. *champa*. An evergreen regal tree, fine foliage, large primrose flowers powerfully perfumed with cowslip aroma. Planted near temples, for the arrows of the god of love are tipped with five flowers, namely, from the mango, *Messua ferrea* *Pavonia odorata*, *Strychnos potatorum*, and the champa tree. Bitter aromatic bark, infusion or decoction invaluable as tonic or febrifuge, root bark emmenagogue, lemon-coloured flowers, applied to foetid nostrils, odorous capsules used for bodily induction, and the fruit eaten.

Moringa pterygosperma, v. *sanjna*, horse-radish tree. The fresh root in appearance, taste, smell, and medicinal properties as stimulant and diuretic, well deserving the name. Bark, flowers, gum, oil, anti-spasmodic ; leaves locally applied to relieve facial neuralgia, or earache.

Myrsine Africana, v. *chachri*, *bebrang*. Hedge shrub, pink white flowers, fruit called baberang, seeds anthelmintic, carminative, and applied to ring-worm. *Embelea ribes* seed also called baberang.

Nerium oleander, v. *kanira*. Shrub, rod-like stems, pink, deep red, white variegated flowers, both single and double of each. Partial to dry stony river-beds. Tincture of root bark prescribed internally and a paste locally applied to ringworm

patches. Every part of the plant is poisonous, and twigs, maliciously added to the water of boiling meat, have been proved the cause of tetanic symptoms.

Nymphae, v. *nilofar*, water lily, apparently in bazar demand, although about Dalhousie no marshes favorable to growth. Watercress thrives in slow running streams with a bottom of sand or gravel. There are white, brilliant red, and rose-coloured lilies. Firminger describes *Nymphaea cærulea*, a tulip size, many-petalled blue flower with yellow centre, emitting orris root like perfume. Filaments of certain varieties are either astringent or febrifuge. Paste combinations are applied to erysipelas or external inflammations. Large leaves serve as bed sheets, very cooling in fevers. The stocks of the lotus and other species supply starchy food during famines, but not to the same extent as the singhara (water chestnut), said to keep alive 30,000 people for five months annually in Cashmere.

Olea, v. *zaitun*. The wild olive, fig, vine, and pomegranate, may occasionally be seen together at Subathoo. It is believed that a good quality of oil can be obtained in the Punjab. Castor, croton, til, apricot, lemon grass, nutmeg, sandal-wood, omum, amongst other oils, are convenient for hospital requirements. Those of linseed, poppy, castor, and mustard, of very uncertain strength. At Dalhousie a merchant sells a large variety of fragrant oils extracted from roses, jasmine, champa, khus-khus, henna, cinnamon, cloves, and the pouch of the civet cat.

Ougeinia dalbergioides, v. *sandan*. Tree short, crooked, gnarled trunk, pink fragrant flowers. Buds yield red gum resembling kino.

Oxalis corniculata, v. *amrool*, yellow wood sorrel. A pretty little annual, purple foliage, yellow flowers, and containing oxalic acid. Leaves, leaf juice, stalks, flowers serviceable in dysentery. Plant antiscorbutic, refrigerant.

Palmaceæ, v. *trina raja* (king of grasses) *khurma narial*. Of the tribe generally the fruit pulp, root, and terminal buds refrigerant, diuretic; the alkaline ashes remedial for rheumatism. Solitary palms about hill ravines recall to remembrance the magnificent date trees of Mooltan. The betel and the cocoanut grow together in Western India. The sago palm prefers the most warm climate of the Indian Archipelago. The seeds of areca catechu or betel palm chewn with chunam and leaves of betel pepper universally used as masticatory, aromatic, carminative, stimulant, disinfectant, and aphrodisiac.

Piper bette, v. *pán*. Betel leaf pepper: shrubby creeper. Leaf juice stomachic, especially when combined with camphor, cardamoms, cloves. Leaves warmed and smeared with oil and applied over chest or liver in pneumonia and hepatitis. To arrest secretion of milk or reduce glandular swellings, layers of warm leaves are used. Leaves also similarly adapted to lull headache and in another form to dress chronic ulcers. The *pán* stalk serves as a convenient method of overcoming infantile constipation by local stimulation.

Pana Indica, v. *bankhor pankar*. Horse chestnut so attractive about Dalhousie especially on mountain slopes; the bark febrifuge, the fruit applied to rheumatic joints. Liquor *castanæ equinæ* in drachm doses a London remedy for gout, acute rheumatism, and neuralgia; the oil applied externally.

Pavonia odorata, v. *bala*. Fragrant roots aromatic, cooling, astringent.

Pharbitis v. *kaladana*, weed creeper, azure blue flower, seeds purgative, resembling jalap in action, the dose thirty grains, but Waring suggests fifty grains of a powder composed of *kaladana* five drachms, cream of tartar nine, ginger one, all well pounded and sieved.

Pinus longifolia, v. *chir*, produces a fair turpentine, the oleo-resin convenient for preparing plasters, ointments, or fumigating pastiles. *Pinus excelsa*, *chil*, in Kumaon the leaves and branches covered with a kind of manna. *Pinus Smithiana*, v. *raiang*, spruce fir, produces cones, ingredients of *gaja pipal*, a concoction recommended for asthma and diarrhoea. *Pinus Webbiana*, v. *tos*, silver fir. Dried powdered leaves used for asthma or haemoptysis. All these four conifers flourishing at Dalhousie, especially at Bukrota.

Plantago isphagula, v. *isphagul*. Annual, with short stem, imbricated small white flowers, Persian plant, but seeds sold in all bazars as specific in chronic diarrhoea or certain phases of dysentery, two teaspoonful doses. Bruised seeds answer as emollient poultices and the leaves applied to bruises.

Pongamia glabra, v. *kurunja*, Indian beech. Large tree, almost evergreen, flowers mixed blue, white and purple, leaves bright glistening green. Seeds yield by expression a fixed oil, useful externally in skin diseases or as embrocation in rheumatism. The leaves and pods as poultice to clean ulcers infested with worms.

Populus, v. *safaida*. At Dharmshala near Bhagsoo barracks young poplars are growing very rapidly,

and the straight avenue, a mile long of poplars 100 feet high near Sirinagar, is made familiar by photographs. Bark vermifuge, buds alterative. Besides black and white varieties other species yield a balsamic exudation.

Platanus orientalis, v. *chinar*. The plane trees of Chumba, Kangra, Kashmir, do not appear noted in native medicine; and though the larch is credited with astringent and stimulant properties in cases of profuse bronchitic expectoration, the European tree as yet does not like the Himalayas as compared with the Alps. Brandis appears contented with the deodar, which, however, does not yield such good turpentine.

Punica granatum, v. *anar*. Decoction of pomegranate fruit rind useful in diarrhoea and dysentery, also convenient in combinations to act as gargle, lotion, or injection. Decoction of root bark of male tree is well known as specific to expel tapeworm. Afghanistan supplies the best fruit. At Meerut and on the road from Kussowlie to Simla the scarlet flowers and the rich dark green leaves of the wild pomegranate attract attention.

Quercus ilex, v. *ban*. After the lordly trees of old England the Holm oak looks very insignificant, but has many astringent properties of other varieties, and the oak galls answer for diarrhoea, dysentery, or intermittent fever. Serve also as ingredients of lotions, gargles, or astringent injections. The decoction has been given, according to Waring, in cases of poisoning by opium, aconite, or datura as an antidote. The excellent tea of Palampore doubtless would be equally efficacious.

Quamoclyt vulgaris, v. *kamlata*, Barbadoes sweet William. Crimson Cypress Vine. A very pretty.

creeper, small vivid scarlet flowers, deep green foliage like fennel; seeds purgative. The *Convolvulus minor*, *Convolvulus major* (morning glory), the traveller's midnight lilies, and the moon flower, all related, with apparently the same aperient qualities. *Mirabilis jalapa*, *gool-i-ubbas*, the marvel of Peru, bearing flowers crimson, yellow, white; ever changing colour on the same plant, very abundant at Subathoo.

Rhododendra, v. *chin*, *aru*, *bras*. Flowers damask at Simla, Landour, Dalhousie, Dharmasala; mauve, pink, white, or yellow at Darjeeling, where twenty-four species flourish according to Gamble. Flowers made into jelly or applied for headache. Leaves of *talisfar* smoked as stimulant. Leaves of *booloo* poisonous. Bark of several varieties excellent snuff. Flower buds and young leaves said to poison cattle. A kind of intoxicating drink prepared from the crimson scarlet flowers of one kind.

Rottlera tinctoria, v. *kamala*. Large shrub, white and yellow flowers. Capsules covered with bright red powder found also in leaves and stalks. Consisting of minute hairs and a resinous substance, this powder of peculiar odour is in two-drachm doses a specific to expel tapeworm; leaves and fruit applied to stings and bites. An ointment recommended for skin diseases. Chief value depends on the mealy inflammable granula *kamala*, large quantities of which have been forwarded to hospitals from the botanical gardens at Saharanpore.

Salix, v. *bed*, *pani jama*, *bed mushk*. There are many varieties of willows, and although the presence of salicine, the neutral principle of the bark, has not been satisfactorily demonstrated as yet, it may be

only a question of time. Poplar contains salicine. Elsewhere salicine may make an excellent substitute for quinine, and salicylic acid has proved a wonderful specific in acute rheumatism. Dr Ringer at Dalhousie satisfactorily treated a lady with expensive salicylic acid, which eventually no doubt will be extracted from the willows growing near the water brooks of Lahore, Peshawur, Dharmasala, Kashmir, or Dalhousie itself.

Sapindus detergens, v. *rita*, soap-nut. Handsome small tree, white flowers. Seeds expectorant and prescribed for epilepsy, or externally applied to abscesses, else to clean hair. Fruit pulp used to wash clothes.

Shorea robusta, v. *sal*. Large tree, yellow flower. Resin, v. *ral*, prescribed for dysentery, applied to ulcers or chilblains, else to make plasters or to burn in pastiles for fumigating sick chambers.

Strychnos potatorum, v. *nirmali*, clearing nut tree, middle-sized evergreen, white fragrant flowers. Young fruit emetic eventually astringent. Ripe seeds, clear muddy water.

Terminalia arjuna, v. *arjan*. Tree with buttressed trunks. Fruit tonic, bark astringent, leaves applied to soothe earache.

Terminalia bellerica, v. *bahera*. Belleric myrobalans. Half-ripe fruit purgative, afterwards astringent; kernels narcotic and locally astringent. Decoction recommended to relieve mucous discharges from lungs or bowel.

Terminalia chebula, v. *har. haritaki*. Galls formed on the young twigs given in diarrhoea or dysentery. Fruit serviceable in fevers, asthma, dyspepsia, ascites, enlarged spleen or liver.

Taxus baccata, v. *brahmi*. Bark decoction of yew given for rheumatism, the sedative leaves in epilepsy, but both leaves and berries may excite vomiting, purging, or tendency to coma.

Tamarindus Indica, v. *imli*. Pulp purgative occasionally, but mild laxative as a rule, seeds anthelmintic, leaves and bark astringent, antiscorbutic.

Tinospora cordifolia, v. *gilo gulancha*, a climbing hedge shrub, yellow flowers. Root tonic, diuretic, demulcent, febrifuge, useful in ague, dyspepsia, chronic rheumatism. Stem, leaves, root, watery extract, all of service, and the young leaves applied to erysipelas.

Tribulus atulus, v. *rasha*, low trailing plant, yellow scented flowers. Seeds diuretic, astringent.

Vitex negundo, v. *samala*. Five-leaved chaste tree. Tall shrub, blue fragrant flowers. Root tonic, febrifuge, vermifuge, diuretic. Leaves smoked in headache and catarrh. Dried fruit vermifuge. Leaf juice applied to scrofulous ulcers. Heated leaves applied to sprains or painful joints will marvellously afford relief; a decoction of the leaves also answers admirably.

Ulmus, v. *maral*. Very fine elms in Chumba, the bark, astringent, alterative, tonic; the decoction beneficial in psoriasis; the leaves applied to boils.

Zingiber, v. *adrak*. Excellent ginger at Subathoo and Kangra; the fresh rhizome very palatable. Aromatic, carminative, stimulant in colic and digestive derangements, else locally applied to lull the agonies of headache, neuralgia, or toothache.

The following list of gums should be included amongst local therapeutics, namely, the various acacias, tamarisk, prune, mango, dhak, horseradish

tree, cashaw, odinà wodier, bombax, semul, conocarpus latifolia, apricot, soapnut, jack tree, hog plum, wild cherry, sal, likewise the products of the fragrant firs and goodly cedars.

At Dharmasala the beautiful church with stained-glass windows, stone pulpit, and painted chancel, together with the peaceful pretty cemetery, owe much to the taste and zeal of the Reverend J. H. Hocking, who trained the honey-suckle and ivy up the walls, and planted willows, poplars, horse chesnuts, yews, oaks, and cypresses to contrast with every bright flower, with the green turf and neat meandering paths of gneiss or limestone. Beneath the snows and sharply-pointed granite peaks of 16,000 feet elevation, here rests Lord Elgin, whose epitaph might also be inscribed over Lord Dalhousie, to whom people in India are indebted for trunk roads, railways, postal and telegraphic systems, the fertilising Baree Doab canal, forest conservancy, the cool hill-stations on the Murree and Chumba ranges, the tea plant at Kangra, the public dispensaries, and every kindly encouragement to those digging laboriously in the mines of research into the botany, geology, and zoology of the Punjab. Many of the plans of Lord Dalhousie are now prospering.

“He, being dead, yet speaketh.”



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